AMERICAN GAS JOURNAL

APRIL, 1938

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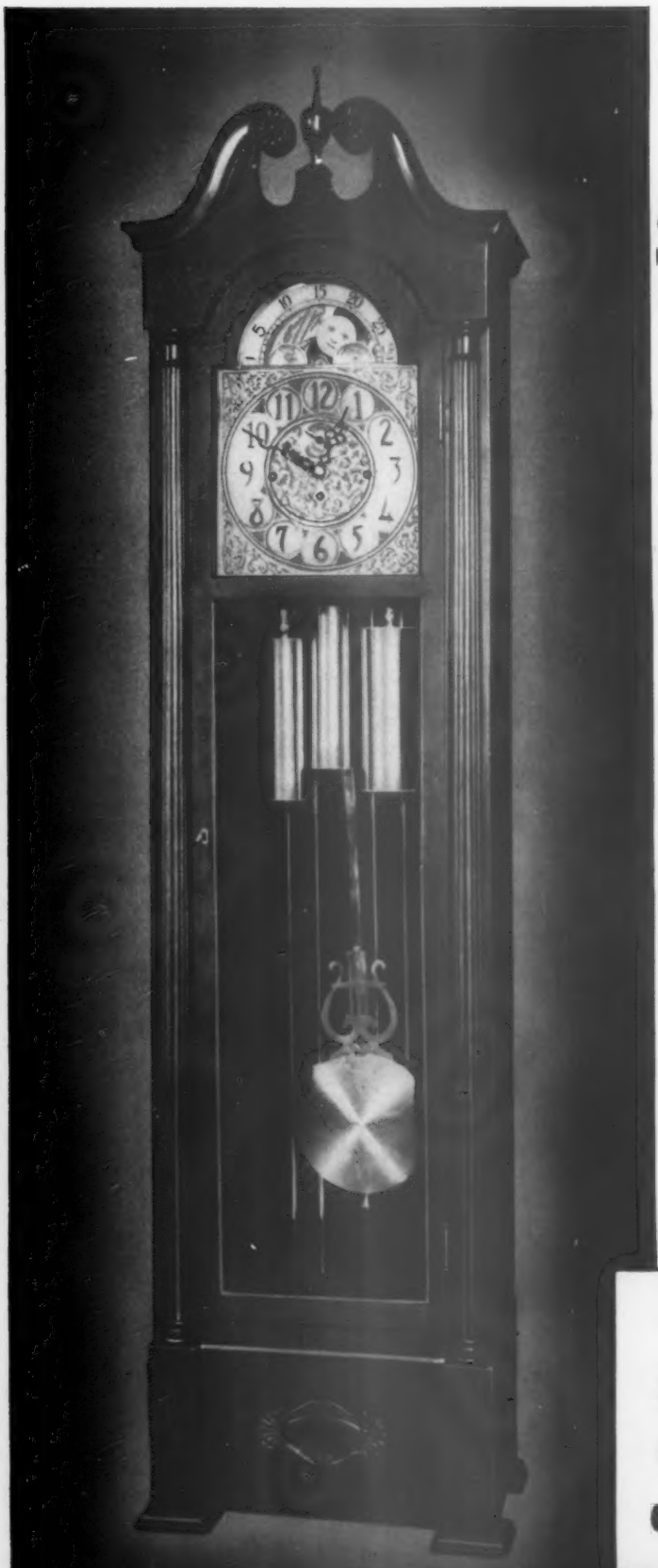

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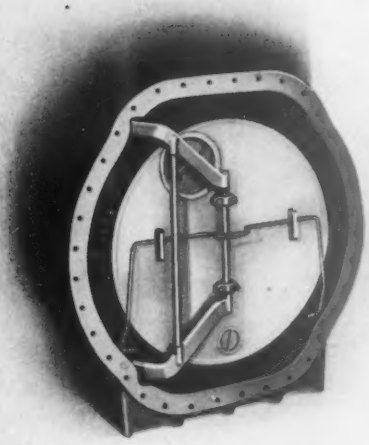

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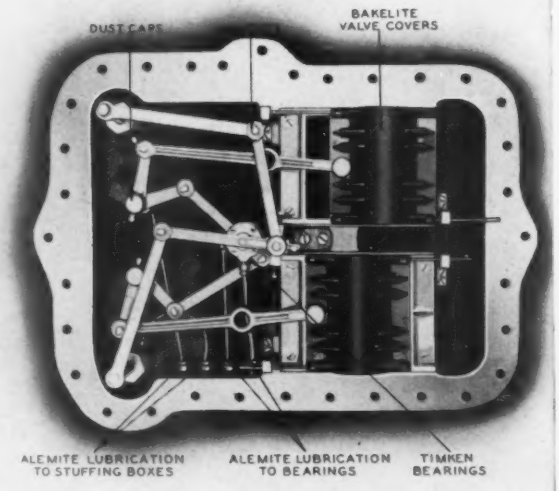

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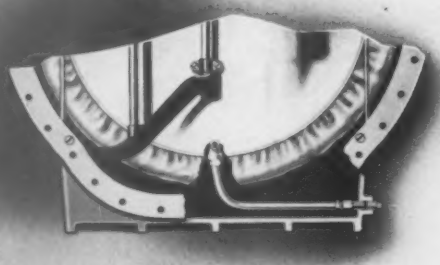

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APRIL
1938

AMERICAN
GAS JOURNAL

VOLUME 148
No. 4

The Immersion Burner

By
Raymond F. Mann

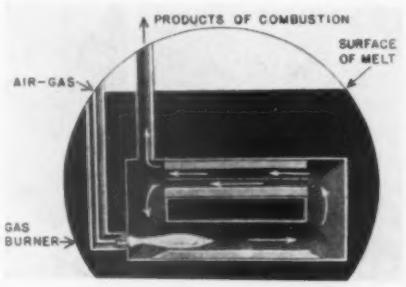
Wentz-Mann Company
Kenmore, N. Y.

In scanning the entire field of industrial gas usage the most outstanding development of the past five years is undoubtedly the remarkable advance in the design and application of the immersion system of gas firing. By immersion system is understood that method of combustion in which the gas is burned inside of a coil or pipe which is itself "immersed" or situated within the body of the substance to be heated.

There are upon the market today and in wide use throughout the commercial and industrial fields a number of standard types of equipment that employ the immersion principle. To mention a few, there is the Pitco Frialator; the Sellers High Pressure Boiler; the Sellers Immersion Water Heater; the Vulcan, the Star, and the Deep Sea Deep Fat Friers; the Ensign-Reynolds Soft Metal Furnaces; and the Kemp Stereotype Furnaces. These are all comparatively low temperature operations but the field is far from being limited to such applications. The radiant tube which has proven such a boon to the industrial gas engineer for such processes as bright annealing, vitreous enameling, malleable annealing, ceramic kiln heating, and other operations at equally high temperatures is but a special form of immersion heating.

Properties Which Promote its Progress

What is the reason for the widespread development of immersion heating? What special property does it possess that has caused its advance by leaps and bounds? The answer should be quite obvious:—efficiency. The layman having the most limited knowledge of combustion can easily comprehend the greater possibilities for high efficiency when the heat necessary is generated entirely *inside* of the object to be heated. External heating is always accompanied by certain losses that are eliminated in the immersion method. In external firing a certain proportion of the heat generated is bound to be lost through the setting, the exact proportion depending on the shape and insulation of the latter. It is extremely difficult to design baffling or to obtain flame travel that will cool the products of combustion as close to the temperature of the product itself as occurs with immersion heating. The coefficient of heat transmission will be lower. All these factors spell a lower efficiency and ofttimes provide the differential that tips the scales one way or the other in competition with other fuels.



Cross section of one type of gas immersion heating element showing tubular construction and method of flue gas travel.

Soft Metal Melting

Consider just one field. The original heating of stereotype pots in the newspaper plants of this country was by hand fired coal or coke. Ten years ago gas, externally fired, but automatically controlled, was rapidly displacing the slow, dirty, unreliable, in general unsatisfactory coal firing. Electricity was hardly a factor then. But look at the picture five years ago. Gas in full retreat and electricity predominant. Electric immersion elements, practically 100% efficient, no big combustion chambers, no overheating of the pot, no high dross losses, fast response, fast pick-up, well insulated compact pots, and operating costs often lower than gas had been. Gas was definitely threatened with the loss of this entire industry. Then Kemp and their immersion system of gas firing, and today gas replacing electricity even more rapidly than the reverse was true a few short years ago. Immersion firing with gas was necessary to obtain an efficiency high enough to supplant immersion heating with electricity.

Cooking Operations

The same story is true for deep fat frying in the restaurant and bakery fields. First, externally fired gas replacing coal or coke. Next, electric immersion elements replacing gas. Today, gas immersion designed kettles supreme. Due credit in this case, however, should be given to another advantage of the immersion method besides that of economy in fuel cost. In the old externally fired type heat was applied to the bottom of the kettle. As a consequence when the usual sediment sank to the bottom it was baked on. This resulted in overheating and destruction of the fats. In the immersion fired kettle there is a

Tube Arrangement in Deep Fat Fryer

comparatively cool reservoir at the bottom below the heating coil in which the sediment collects and from it can easily be drawn off. Excessive temperatures are not necessary to drive the heat into the grease and as a result there are savings in fat running as high as 40%. This is more than enough to justify the adoption of the new kettles.

Enameling Furnaces

The success of the radiant tube, gas heated, in replacing electricity in vitreous enameling furnaces, in making economically possible gas-fired short cycle annealing furnaces for malleable iron, in opening a long closed field in ceramic kiln work, in winning such a position in the bright annealing of steel sheets, all demonstrate the powerful competitive angle of the immersion system.

History of Progress

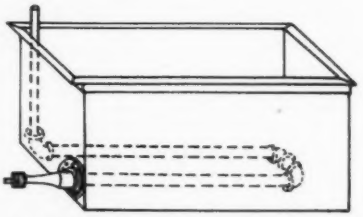
Turning now to the historical background of gas immersion burners, we find a little difficulty in tracing their development. Certainly the pressure type has been known for some time. The Surface Combustion Company was building cleaning tanks containing coils and fired by their low pressure system as far back as 1922. Who first introduced the atmospheric type is perhaps open to question. The Pitco Company had doughnut kettles and deep fat friers of this design as early as 1930. The first full recognition of the industrial possibilities of this system and its introduction to the trade seems to belong to the Chas. A. Hones Company. About 1931 they offered an atmospheric burner specifically designed for immersion firing, tanks built containing coils, and information as to proper coil sizes, lengths, etc. As to the rapid acceptance of this idea and its immediate spread there is no question. Considerable research followed, notably that by Biemiller at the Consolidated Gas of Baltimore, published in the AMERICAN GAS JOURNAL of November, 1934. Then, Industrial Service Letter No. 26 by Segeler of the American Gas Association which gives such complete information on the entire subject that no industrial gas engineer worthy of his salt can be without it.

The gas fired radiant tube was introduced to industry by Lee Wilson in 1932 and was first applied to the bright annealing of steel sheets. These first radiant coils entering from the side of the furnace made a 90° bend and ran vertically through the furnace. The Surface Combustion Corporation soon came out with the coil lying in a horizontal plane and added the diffusion type of flame, thus getting an even distribution of heat over a considerable length of coil. Success in this first field lead to work on vitreous enameling, clean hardening, and the many other applications that are a commonplace today.

Because of the high temperatures involved, the tubes must be of special nickel-chromium heat resisting alloys. A diffusion burner is likewise essential for any great length of coil. Also, the so-called "ejector," a method of creating adequate draft, consisting of an air jet at the discharge end of the coil, comes into play. Thus the design and appliion of radiant tubes is rather outside the every day scope of the gas company's industrial engineer and hence will be omitted from further discussion here. This, however, should not be construed as any reflection on their importance. On the contrary, their increasing utilization is probably the greatest asset of industrial gas today.

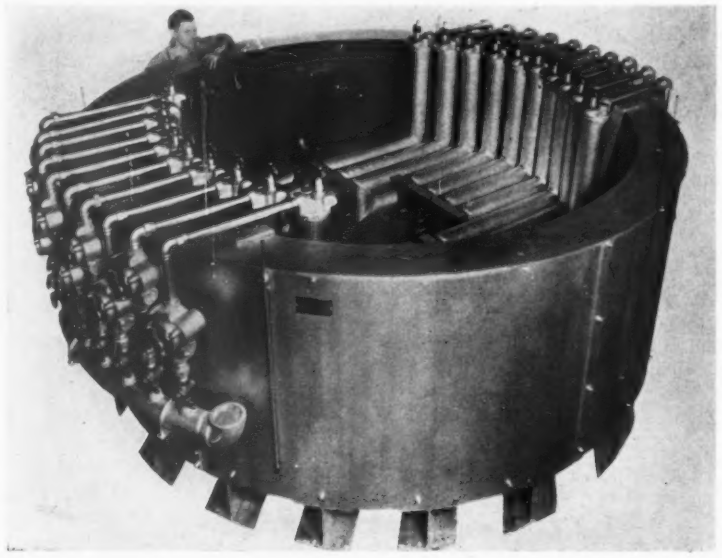
Design

Returning to the atmospheric type, the first question in their design is that of the coil surface necessary for the transmission of the required amount of heat from hot flue gases, through coil walls, and into the substance to be heated. The measure of this transmission, the so-called overall coefficient of heat transfer varies with the material being heated. As they are the more common the heating of water and aqueous solutions will be considered first.



A simple form of gas immersion heater installation with pipe coil inside and gas burner outside the tank.

Four manufacturers of atmospheric burners for immersion heating show a range of from 8,000 to



A gas immersion heated melting unit recently fabricated for the Goodyear Tire and Rubber Co. With a capacity of 60 tons of lead the unit has an output of 30 tons of molten metal per hour. The connected load of 3800 cu. ft. of 1050 B.t.u. gas per hour is purposely larger than the actual needs during full production to allow for the intermittent casting periods. This shows the Gas Immersion Units, their location, etc.

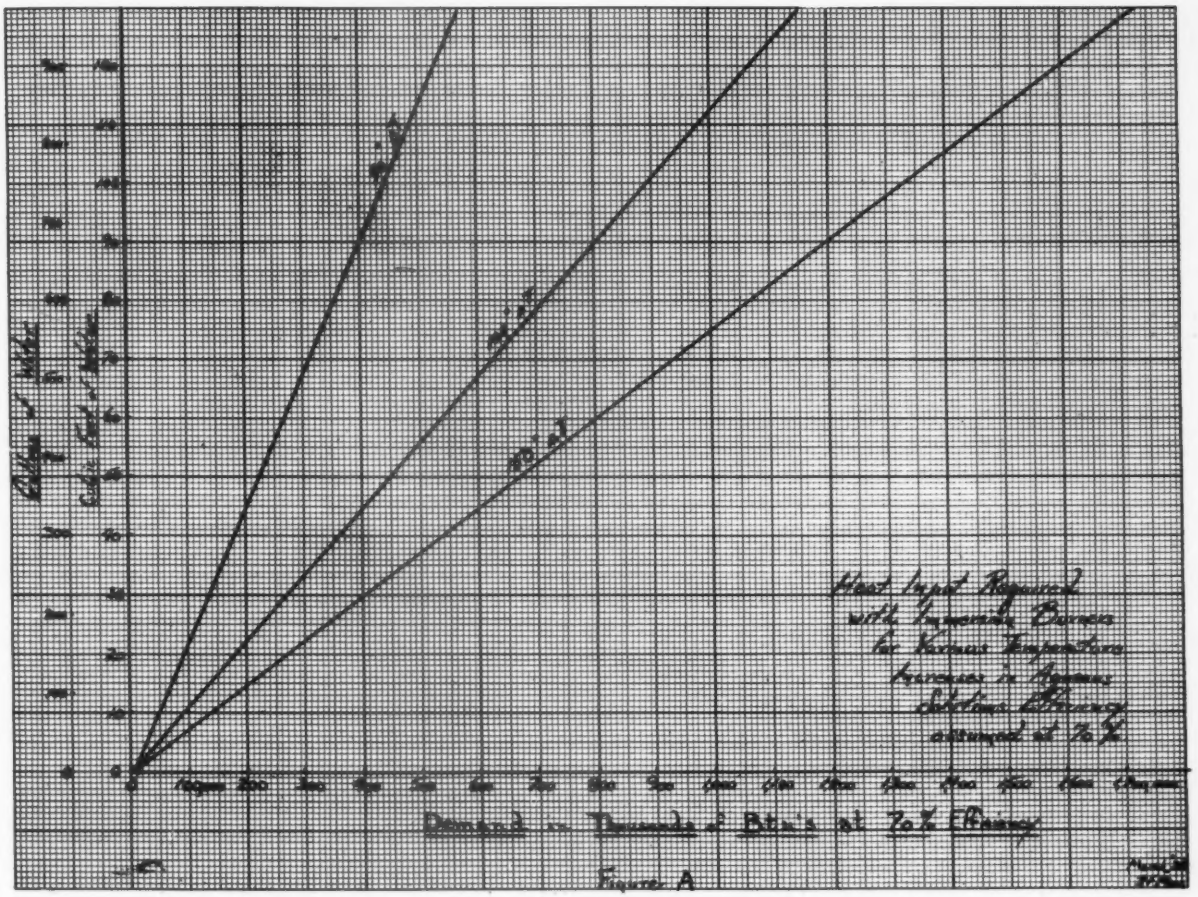


Figure A

12,000 Btu input per square foot of external coil surface. Industrial Service Letter No. 26 recommends a figure of 8,750 Btu input based on an 80% efficiency of combustion or an actual transmission of 7,000 Btu. The truth is, of course, that all these figures are right. A wide variation is possible with satisfactory results. There are certain limits, however, that should be drawn for each particular case. At one end the limiting factor is completeness of combustion and freedom from condensation, and at the other extreme is high stack temperature and lower efficiency. If the coil is too long horizontally for the draft exerted by the vertical flue distance, friction reduces the velocity of the discharge of waste gases and in turn the secondary air induced. The result is a large lazy flame, perhaps to the point of smothering and incomplete combustion. Too many bends in the coil act the same way. The importance of the length of vertical flue is well illustrated in a table in Letter No. 26 which shows an increase in capacity for a 4" coil approximately 8 feet long from 66,000 Btu input with a 20" flue to 113,000 Btu with a 70" flue (roughly from 7,000 to 12,000 Btu per square foot of external surface). Good practice will call for a flue at least 4 feet long, and, if capacity and speed are required, 7 feet. Also as few 90° bends as possible and the use of all ells and sweeps rather than chamfers. With a very good draft, perhaps induced by an exhaust fan, it is possible to use such a length of coil that the products of combustion are chilled below the dew point and condensate occurs. Then, unless acid resisting tubes have been used, trouble with shortened tube life looms. The turning down of a burner may result in a similar effect. Hence an original design based on a comparatively large surface (a low Btu transfer) will permit of but slight turndown.

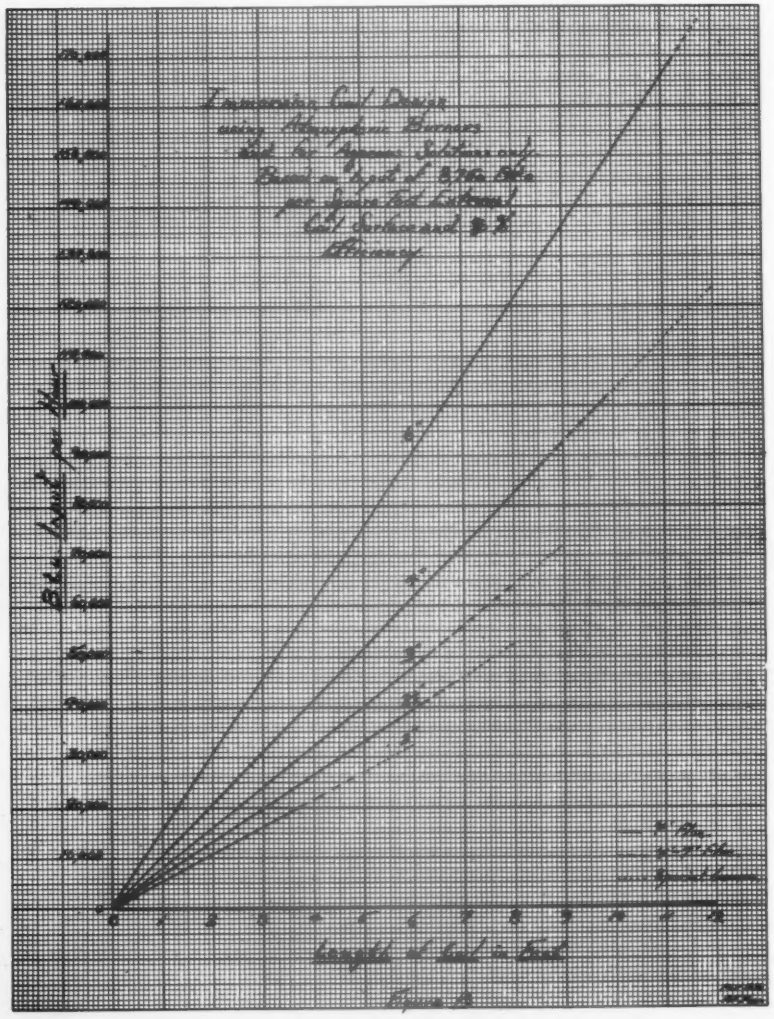
The other extreme is the use of too little surface. The penalty there is lower efficiency. Without adequate heat transfer surface, the flue gas temperature will be high and the desired 80% efficiency unattainable.

To sum up, where full all on-all off operation is proposed and the space is available, design a long coil with a 4 foot flue using a transfer figure close to 8,000 Btu input per square foot of external surface. If space is lacking, the coil may be shortened but the flue length should be increased to correspond. On the other hand if turndown is necessary, design on the basis of 12,000 Btu input per square foot of external surface and be prepared to sacrifice efficiency. In any case don't try for a turndown much below 50%. Instead use two or more smaller coils and turn some off completely for holding the kettle or furnace at heat, leaving those that remain lighted at full capacity. This will make it possible to adhere to the 8,750 Btu figure of the charts given below.

Figures A and B have been drawn to simplify calculations. By means of Figure A, knowing the capacity of the tank in cubic feet or gallons and the desired temperature rise, we can quickly determine the heat input necessary. A 70% efficiency has been assumed which takes care of the 80% combustion efficiency and allows an extra 10% for radiation losses from the tank surface and sides. Next, this heat input neces-

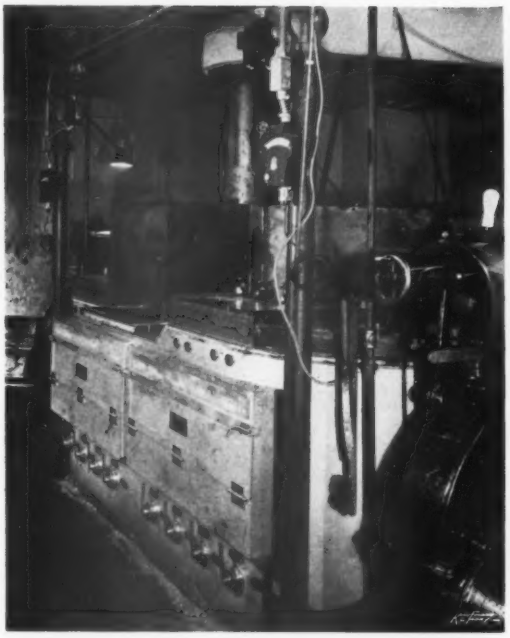
sary (the demand) should be divided by the number of coils to be used. Figure B gives the practical capacities of coils of various sizes and lengths, based on an 8,750 Btu input per square foot of external surface. The actual size of the tank will have a great influence on the length of coil and hence the size of coil, which leads to the next subject, the choice of coil sizes. Before turning to that, however, one point covered in Figure B should be mentioned. It will be noted that beyond certain Btu inputs for each coil size the curve is first a series of dashes and then dots. The curves have been based on 4 foot flues and beyond the capacities of the solid part of the curves a flue of this length may give smothering and incomplete combustion. Increasing the flue length up to 7 feet will permit a greater input and hence a greater horizontal run as shown by the dashed lines. A still larger capacity is possible by going to the pressure type of burner, forced draft, or other special means as shown by the dotted lines, a subject for individual research.

Taking up now the question of coil sizes, whether to use one or two large coils or several smaller ones, and considering the matter from the standpoint of efficiency rather than from that of first cost which favors the larger coils, we find that in actual practice 4″ and 6″ are quite common. The danger, however, with these larger coils is the same that has led to the adoption of 1″ tubes in vertical gas-designed high pressure boilers in place of the conventional 2″ tubes of the coal-designed boiler. The cause of the lower efficiency in the larger tube is often referred to as "channeling" of the hot gases. This word hardly explains the real mechanism. Too often it is forgotten that when gases flow through a round tube, unhindered by baffles, the velocity of the gases varies from tube surface to core. At the core or center the velocity is the greatest while at the tube surface there is a layer, minute in thickness perhaps but none the less actual, that is stationary. In the flow of heat from moving gases to tube surface it is the thickness of this stationary film that is the determining factor. The thicker the layer, the poorer the transfer. But, the thickness of this layer depends on the velocity of the gases. The greater the velocity, the thinner the layer of stationary air and hence the better heat transfer. Thus suppose two 2″ coils are used instead of one 4″ of the same length. The square feet of pipe surface is virtually the same but the cross sectional area is only one-half as great. Therefore, for the same total Btu input the velocity through the two 2″ tubes will be twice as great as through the one 4″ tube. In consequence, the thickness of the stationary layer must be less and the heat transfer better for the smaller tubes. In actual practice with immersion burners, in the smaller sizes at least, the turbulence created by the bends in the coil together with that caused by the mixing of secondary air with the flame to some extent counterbalances the effect just described. In the larger sizes it undoubtedly exists and hence the recommendation to avoid the 6″ size and even the 4″ if maximum efficiency is the aim and economical considerations are not too pressing.



Next, the location of the coils in the tank or furnace. Rather obviously, if we wish to heat the entire contents to a uniform temperature we must place the coil near the bottom. Actual contact with the bottom must be avoided or heat will be lost by direct conduction. Another consideration is the dirt or sediment that is apt to settle out and sink to the bottom. The coil should be high enough to form a comparatively cool and quiet reservoir in which such material can collect and be drawn off periodically. Generally 3 or 4 inches is enough.

Another point deserving of mention is the general practice of bringing the tubes in through one side, around or across the tank, and then up and out *inside* the tank rather than through the opposite wall. This is done to avoid a welding job somewhat beyond the capabilities of the usual welder. Due to the interior heating, an expansion and contraction occurs in the immersion tube that, with one end free to move, of-



The world's largest stereotype melting unit is heated by gas immersion. Holding 12 tons of metal this pot furnishes 38000 lbs. of molten metal per hour. It supplies metal to two automatic plate casters.

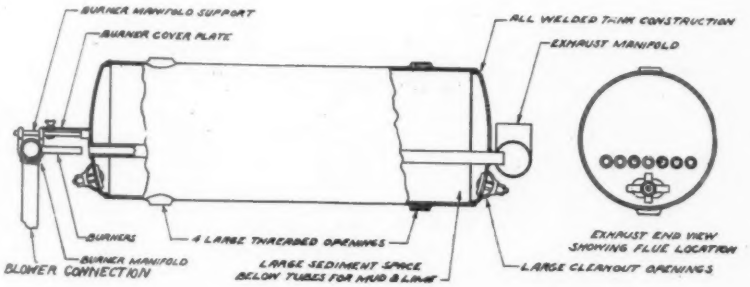
fers no difficulties. If, however, both ends are fixed and the tube held rigidly between two walls, a considerable stress is set up at the junction of pipe coil and wall. Proper design, heavy enough metal in the wall, and above all, an expert welding job are necessary. It can be successfully done as witness the Sellers immersion type water heaters and boilers (see Figure C). It is advisable, though, in the average shop not to attempt it. If the tank is a closed vessel or the material heated such that the fairly hot flue pipe can not safely be brought up through possibly easily inflammable vapors, then loop the coil and bring it back and out the same wall as it enters.

Leaving for a moment the heating of aqueous solutions, let us consider the heating of other materials such as oils, asphalts, and the soft metals (lead, tin, babbitt) by the immersion method. Each of these materials differs from water in the resistance it offers to the flow of heat. Hence a greater or less coil surface will be required for the transfer of an equal amount of heat from hot flue gases to material. Oils with their lower coefficient of thermal conductivity should require a little more heating surface. It is also desirable to increase the coil size in the section nearest the burner to one size larger to prevent any possible overheating at that point. Asphalt, besides having a lower coefficient, adds to the complications by almost invariably containing some free carbon and some organic materials that are easily cracked at relatively low temperatures to produce more free carbon. If this is deposited on the coil, it burns on and, acting like an insulator, soon causes the coil to burn out. It is therefore absolutely essential to prevent overheating. The diameter of the coil should be doubled at the burner with a sleeve of the original size extending in from the burner at least the length of the flame. An excess of air will also aid in preventing too high a flame temperature. A number of small burners well distributed throughout the kettle rather than one or two large burners will mean a greater speed in heating up. Asphalt is such a poor conductor of heat that it travels but slowly away from each coil. Not over an input of 7,000 Btu per square foot of external pipe surface should be attempted.

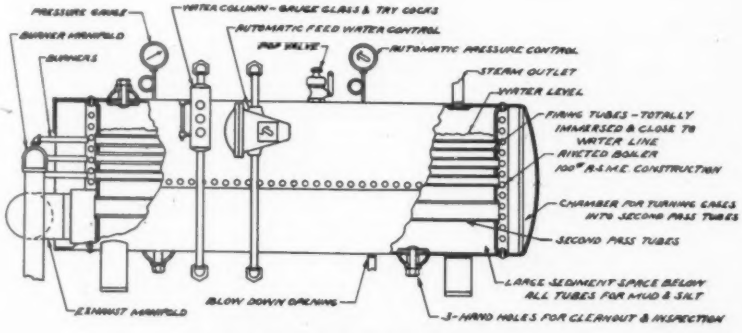
The soft metals with their high coefficient of thermal conductivity are at the opposite end of the scale from asphalt. They can easily handle an unput or 14,000 Btu per square foot when molten. If solidified, heat must be applied very slowly at first.

Oven Application

The next application to consider is the heating of ovens, an immersion burner and coil being used but the coil surrounded by air. Occasionally such a design crops up in heating a material that will be damaged by the products of combustion, or where an open flame would represent a fire hazard. Disregarding for the moment whether or not an immersion burner is the best way,

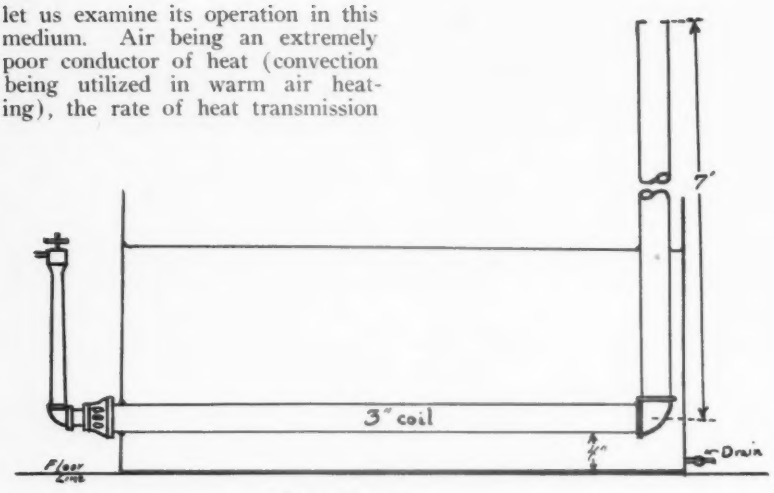


SELLERS BLAST TYPE STORAGE TANK IMMERSION WATER HEATER

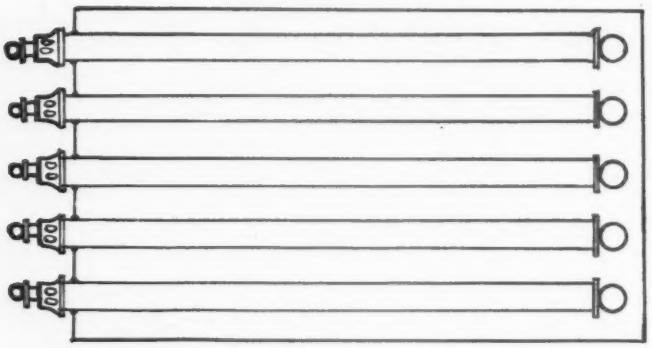

PRESSURE GAUGE
WATER COLUMN - GAUGE GLASS & TRY COCKS
BURNER MANIFOLD
AUTOMATIC FEED WATER CONTROL
BURNERS
POP VALVE
AUTOMATIC PRESSURE CONTROL
STEAM OUTLET
WATER LEVEL
FIRING TUBES - TOTALLY IMMERSED & CLOSE TO WATER LINE
RIVETED BOILER 100# A.S.M.E. CONSTRUCTION
CHAMBER FOR TURNING GASES INTO SECOND PASS TUBES
SECOND PASS TUBES
LARGE SEDIMENT SPACE BELOW ALL TUBES FOR MUD & SILT
EXHAUST MANIFOLD
BLOW DOWN OPENING
3-HAND HOLES FOR CLEANOUT & INSPECTION

SELLERS HORIZONTAL IMMERSION BOILERS

let us examine its operation in this medium. Air being an extremely poor conductor of heat (convection being utilized in warm air heating), the rate of heat transmission



Side Elevation



Plan

from the coil becomes rather small. Tests that we ran in preparing the design of wire baking ovens showed an input of just under 1,000 Btu per square foot of external pipe surface with the oven temperature at 320° F. This gave a fairly high stack temperature (app. 800° F.) and an actual gross efficiency of about 65%. These figures apply to oven heating in which the air is at rest. If, however, a fan is used to blow the oven air over the immersion coil, the rate of heat transmission is increased many times, the exact amount depending directly on the velocity. (This is in line with the discussion above as to the advantages of small tubes.) This is demonstrated in the gas unit heater of tubular design. There with a velocity of 767 feet per minute some 3,130 Btu per square feet of surface are given up to the air.

Calculating a Typical Example

Enough perhaps has been given to indicate the proper design of coils. Let us then run through a typical example, taking the same problem that was used last month to illustrate the design of drilled pipe burners. A tank 5'x3'x30" containing water to be brought to a boil in 1½ hours. The same calculations apply at the start. 5x3x2 (allowing 6" for the water level from the top) equals 30 cubic feet or 1,872 pounds of water. 1,872x(212-60) equals 285,000 Btu in one hour or 190,000 Btu/hr. if 1½ hours allowed, assuming 100% efficiency. In this case as before we can assume an efficiency with reasonable accuracy. Using 70% as a safe figure, the input becomes 190,000 divided by .70 or 271,000 Btu/hr. Taking the AGA figure of 8,750 Btu per square foot, we will need 31 square feet of coil surface. This corresponds to 34 lineal feet of 3" or 26 lineal feet of 4" pipe. The tank is 5 feet long and with a 2' submerged flue, each coil will be approximately 7' long. That means 5—3" or 4—4" coils. If we choose the former we will have 5—1½" atmospheric venturi burners firing into 5—3" coils running the length of the tank and up 7' vertically (see sketch).

When installed we will perhaps wish to check our results by running an Orsat and taking the flue temperature. If we find a low CO_2 due to a little too much draft, cap each flue or weld a plate over the end, drilling it out to about 2" diameter, more or less, as needed to give a CO_2 close to 8%, no CO and a stack temperature not over 500°F. Comparing the design given just above with that for drilled pipe burners last month, noting the much smaller Btu input to accomplish the same heating, the smaller space requirements, the possibility of insulating the tank itself, the general simplicity and economy of the immersion system, it is evident why this type of gas combustion has made such remarkable strides in such a short time.

St. Petersburg Fla. Appliance Dealers Oppose City Merchandising

Members of the St. Petersburg Gas Appliance Dealers' Association, St. Petersburg, Fla., appeared before the council committee on public utilities and verbally opposed the city's plan to engage in the retail sale of gas appliances.

E. S. Lanning, president of the Association, spoke in opposition to the city's plan to retail gas appliances, commending the advertising campaign which has been conducted by the gas department during the past year.

Frank M. Harris, attorney for the Association submitted a counter-proposal consisting of five recommendations:

(1) That the city employ a man to promote the use of gas and gas appliances, to coordinate advertising and selling campaigns, to foster a greater feeling of loyalty among city employes toward the use of city gas, to develop prospects for the merchants and plumbers.

(2) That the city employ a home economist who shall demonstrate the use of domestic thermostatically equipped gas appliances, a fee of $1 to be paid the city by the dealers for each appliance purchaser served.

(3) That service charges for the extension of a line from an alley or street be predicated upon the expected load.

(4) That dealers make own installations, to be inspected and adjusted by city-employed inspectors.

(5) That the city set up a financing plan under which it will take over the paper of dealers, the interest or carrying charges to be in line with those of utility corporations and collections made with the regular gas accounts.

The "Detroit Plan" of Gas Rate Control

By

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ON November 19, 1937 domestic gas customers in Detroit were told by the Detroit City Gas Company that they would receive a dividend of $205,383.81, an average of 52 cents per domestic customer. This is the first dividend to be declared under the so-called "partnership" of the Detroit City Gas Company with its customers which was established in 1935.[1] This agreement for profit-sharing does not have the usual features of sliding-scale devices. Nor is it like a cost-of-service franchise. Indeed, it only resembles the much-discussed "Washington Plan" of gas and electric rate control because it effects automatic regulation of the company's profits.[2]

Background of the Plan

Before details and appraisal of the Plan are given, the long-standing conflict between the City and the Gas Company prior to adoption of the Plan may be reviewed.[3] As the "Washington Plan" emerged to solve a prolonged conflict between the Potomac Electric Power Company and the Public Utilities Commission, so did the "Detroit Plan" evolve from about a 15-year controversy between Detroit mayors and common councils for lower rates and the Detroit City Gas Company for the same or higher rates. Twice during this time municipal ownership was threatened, but the City apparently preferred natural gas service to municipal ownership. A high fee was assessed against the Company for use of the streets; but this fee has never been collected, and its collection has now been enjoined by the Federal Court. Finally, it should be noted that the Michigan Public Utilities Commission did not enter the controversy, since it did not have jurisdiction.

Prior to the expiration of its franchise on October 31, 1923, the Company sought rate increases to provide funds for much needed extensions of service. On March 2, 1921, the Council granted a rate increase, a month later a request for another increase was denied, and about a year later rates were ordered back to franchise figures. After its franchise had expired the Company asked for increased rates; the requested rates ranged from 65 to 95 cents per M.c.f. whereas the preceding rates ranged from 49 to 79 cents per M.c.f. A Board of Arbitration of five persons was chosen by the City and Company to decide the case. Engineers of the Company's fixed fair value at $40,000,000 or twice as high as the estimate of the City's witnesses. To be effective for a three-year period after May 1, 1924, the rates fixed by the arbiters, which were approved by the Council, ranged from 58 to 79 cents per M.c.f. It was also decided that the heat content of gas be reduced from 600 to 530 B.t.u.'s per cubic foot. During this controversy Acting Mayor Martin, who vetoed the arbiter's award, sought the City's purchase of the gas plant, but received little support.

A County Circuit Court decision ordered the submission of the Arbiters' decision to a vote. On September 9, 1924, this 3-year franchise failed by a small margin to obtain the necessary 3/5 vote. With no more than a day-to-day agreement, the Gas Company continued to use the rates fixed by the Board of Arbitration in 1924 until hostilities were renewed again in 1932.

Early in 1932 Mayor Frank Murphy with support of the Council began to seek at least a $1,000,000 annual reduction of revenue from domestic gas customers, a decrease which would necessitate a lowering of the top rate from 79 to 74 cents per M.c.f. In a few days the Company offered to make this cut in rates. Before this offer was acted upon by the City it was withdrawn, and a few days later (April 2, 1932) the Gas Company offered to give only a $740,000 annual reduction in revenue. Mayor Murphy and the Company reached an agreement a month later to reduce rates an estimated $850,000 a year, a reduction (top rate 77 cents per M.c.f.) which the Company voluntarily made on June 9, 1932.

Before the Gas Company had made this rate reduction, Councilman John W. Smith proposed that rates be reduced so that the top rate would be 72 cents per M.c.f.—later the top rate in the ordinance was fixed at 77 cents a M.c.f., the figure of the Company's voluntary reduction. Smith further proposed assessment of a rental of $125,000 a month against the Gas Company for use of the streets.[4]

Late in 1934, while litigation on the rental assessments was pending, the Company announced a higher rate schedule. Rates were increased on the blocks below 500 M.c.f., and a rate of 83 instead of 77 cents per M.c.f. for the first 50 M.c.f. was prescribed. After the City had been granted several extensions of time, the Company put the rates into effect on April 8, 1935. Then the City sought an injunction against use of the higher rates, repeatedly delayed the suit, and hired Frank P. Fisher, consulting engineer, who had an important part in formulation of the "Detroit Plan."

In accord with Mayor Couzens' and Councilman Smith's views, Mr. Fisher recommended on April 15, 1935, that the City "make a fair and proper deal" for acquisition of the Gas Company's property and that the matter of bringing natural gas to Detroit be studied. Thereafter, the discussion of the Mayor and Council was principally in terms of construction of a municipally owned and operated

[1] *Earlier dividends were anticipated, but unexpected expenditures totaling $750,000 were incurred during the severe winter of 1935-36. Recent wage increases are the reason given for the fact that this dividend is less than the estimated figure of $500,000.*

[2] *Irvin Bussing,* Public Utility Regulation and the So-Called Sliding Scale, *Columbia University Press, 1936, pp. 97-142;* American Gas Journal, *v. 144, March, 1936, p. 28.*

[3] *The source of many notes about this plan—particularly the events preceding it—was newspaper accounts. Reports of Mr. Frank Fisher to the Common Council were another useful source of information. For the sake of brevity references to these will only infrequently be given.*

belt line for distribution and sale of natural gas to industries and the Gas Company. It was this belt line, which was expected to cost $4,000,000 and was to be partly financed by a PWA grant, that was approved by the Council on August 27, 1935. The question of municipal ownership was scheduled to be submitted to vote on October 8, 1935.

Since 1931 the City had believed that introduction of natural gas service would be one means of obtaining lower gas rates. Indeed the City officials for a time believed that establishment of a municipally-owned gas system was the only way to get natural gas service.[5] Some charged that the Columbia Gas and Electric Corporation prevented the piping of Kentucky and Michigan gas to Detroit,[6] although neither the City nor the Gas Company believed the Michigan supply of gas sufficient. Finally, on August 31, 1935, the Detroit City Gas Company signed a 15-year contract to purchase Texas natural gas from a Columbia Gas and Electric subsidiary. This prompted the city immediately to withdraw the proposal for a vote on municipal ownership. The Council, being satisfied that natural gas service meant lower rates, arranged for conferences between William G. Woolfolk, President of the Gas Company, and Frank P. Fisher to establish the rate controls which ultimately led to the "Detroit Plan."

It was editorially observed on January 3, 1935, in the *Detroit News* that "Detroit might find the plan (The Washington Plan) worth consideration in connection with the Detroit City Gas Company and its demand for higher rates." President Woolfolk of the Gas Company announced on February 2, 1935, that he had always favored sliding scales of rates "because they have the effect of putting utilities into partnership with their communities" and because utility companies are spurred "on to greater efficiency" when "the way is opened to superior earnings."[7]

Mr. Woolfolk's announced opinion on sliding scales undoubtedly affected the result of the conferences which he had with Mr. Fisher beginning early in September, 1935. In the same month Council President Smith expressed his wish for a "Detroit Plan" fixed in terms of minimum and maximum allowable earnings. When Mr. Woolfolk appeared before the Council on September 23, 1935, he announced that Council President Smith's plan "appeals to me as being sound in principle." Within the brief period of the succeeding three weeks, as shown by Fisher's report to the Council on October 17th, representatives of the City and Company agreed upon all the principal features of the present Plan. The Council adopted the Plan on December 17, 1935, and six days later it was given as a consent decree in the Wayne County Circuit Court.

Provisions of the Plan

The Company is permitted, "as a base earning, the sum of $3,850,000 net revenue per annum as a return on its present property." In 1936, for example, this base earning, after deductions of $1,685,000 and $120,000 for interest and preferred dividends respectively, allows about $2,000,000 or approximately 8% on the $26,072,300 of book value of common stock nearly all of which is owned by American Light and Traction Company. Mr. Fisher previously observed that "this plan requires determination of the amount of net earnings after depreciation, necessary for the Gas Company to maintain itself in mechanical efficiency, and in reasonable credit standing, for giving satisfactory gas service." Although he emphatically denies that the base earning was determined by using some valuation base, he noted in one of his reports that the base earning of 3,850,000 was equivalent to a 7% return on $55,000,000. The book value of the Company's plant and working capital was $68,700,000 when the Plan was adopted.

"To this base earning shall be added a sum equal to 7% of all net additions to its present investment in property and assets, used and useful in the natural and manufactured gas service in each fiscal year."

The first $550,000 of annual net earnings in excess of the base earning will be divided equally between domestic customers and the Company. Net earnings above the $550,000 excess will be divided ¾ to domestic customers and ¼ to the Company. This provision was made retroactive to April 8, 1935, the date the Company increased its rates. Such payments to domestic customers will be in the form of a refund which will be made within 90 days after the close of a fiscal year. Only purchasers of gas for cooking or hot-water heating, who live in one-family or two-family dwellings, may receive these dividends. And the refund will be on the basis of a maximum consumption of 60,000 c. f. a year, which means dividends for consumers on the basis of an average purchase of 5 M.c.f. or less a month. Nothing is said about adjustments if the base earning is not earned by the company. There is no guaranty of the base earning. Nor is there to be an annual change in the rates for these domestic customers.

Determination of the net earnings, which are to be calculated after deduction of taxes and depreciation and before deduction of interest and dividends "shall be made in accordance with the Company's present accounting practice." A certified public accountant selected by the Company and City will annually audit the Company's accounts, and the cost of the audit will be treated as an operating expense of the company.

Provision was made for use of a schedule of promotional rates for both domestic and industrial consumers on commencement of natural gas service. The changeover to natural gas was started July 1, 1936, and at that time a new schedule of rates was prescribed. Industrial customers are now served, when to their advantage, under an optional rate providing from a minimum of $120 per month for 200 or less Detroit Gas Units (each D.G.U. equals 530,000 B.t.u.'s); thereafter the rate is graded downward from 48 cents to 26 cents for each Detroit Gas Unit over 20,000 D.G.U.'s.[8] Gas for house-heating may now be had for a flat 32 cents instead of 55 cents per 530,000 B.t.u.'s. For domestic customers there was a reduction to 75 cents for each of the first two D.G.U.'s per month and

[4] *In addition rental assessments of $135,989.35 and $120,551.20 a month were made against the Detroit Edison Company and the Michigan Bell Telephone Company respectively but were never paid. This ordinance became effective January 26, 1933.*

[5] *John W. Smith, "Our Gas Company,"* Public Utilities Fortnightly, *v. 186, July 16, 1936, pp. 83-8.*

[6] *Federal trade Commission, Utility Corporation, 70th Cong., 1st Sess., Sen. Doc. 92, Pt. 84-A, pp. 188-9.*

[7] Detroit News, *Feb. 2, 1935.*

[8] *A Detroit gas unit is equivalent to one M.c.f. of 530 B.t.u. gas. Thus, one M.c.f. of natural gas of 1,000 B.t.u. per cubic foot equals 1.89 Detroit gas units. Like the similar "therm" rates, billing of customers with gas unit permits a rate increase in terms of cubic feet of gas (not in terms of heat units), an increase needed to offset a possible decrease of revenue resulting from introduction of gas with larger B.t.u. content.*

55 cents for all additional units. Fisher had estimated that these rate reductions in the first year of their use saved all customers $2,368,000 and domestic customers $946,000.

It was provideed in the decree that all "legal and equitable rights" of the parties would continue. The Wayne County Circuit Court is to serve as a "forum" for settlement of controversies arising under the Plan, and this Court may terminate or modify the decree on application of one party.

Comments on the Plan

An obvious gain from adoption of the Plan was cessation of the 15 years of hostility between the City and Gas Company. With this solution the City obtained lower rates for all customers (excluding the complication of minimum bills) and its much wanted natural gas service. And the Gas Company ceased to be annoyed by rate and street rental litigation.

This quarrel, moreover, might have been dragged out in court trials, appeals, and retrials as so many rate controversies have been prolonged. Even if it should prove to be only a temporary settlement on Detroit gas rates, this conclussion, despite some of the possible weaknesses to be noted, was deserved. For the purpose of public utility rate regulation even a hasty and incomplete agreement may be better than allowing a rate case to "age" with the consequent costliness of counsel and property inventories and valuations.

There is an incentive in the Plan for the Company to seek more complete utilization of its plant and use of technological improvements. Division of the net revenue in excess of the base earning between the domestic customers and the Company assures Company management that they will retain a portion of the benefits of any economy they effect. A state commission, on the contrary, would aim to take up all such economies in rate reductions, a goal which is usually not regularly achieved because of infrequency of rate investigations or because of the legal requirements obstructing effective regulation.

There may be limits, however, within which the incentive to management may become simply the incentive for further maximization of profits. Choice of the basis of distributing excess earnings, therefore, must be given careful study. The rate structure for domestic customers, moreover, should be carefully selected—even subject to revisions (not periodic) which are not provided for in this Plan—for the purpose of controlling the absolute amounts of excess earnings that are not to be altered from year to year by rate decreases. In fact rates for domestic customers were fixed after (not before) the adoption of the "Detroit Plan." Sufficient time has not yet elapsed to permit observation on the relation of the rate structure and prevailing distribution of refunds to the quantity of excess earnings above the base earning.

The terms of the "Detroit Plan" as well as comments on the Plan—particularly those of Mr. Fisher—imply that a valuation base for calculating the allowable return, which is the procedure of the "Washington Plan," is undesirable and was not used. An observer cannot be certain that valuation of the plant was ignored when the base earning was fixed. It was noted above that in earlier reports, for example, the base earning of $3,850,000 was observed to be the equivalent of 7% of $55,000,000. Furthermore, use of a valuation measurement was necessary for determination of changes in the base-earning resulting from additions to or subtractions from assets. There seems to be no reason for hiding the valuation issue.

The method by which the base earning figure was determined has never been announced. Fixation of the base earning to assure "the Company's financial stability and credit standing . . . to enable it to press vigorously the development of the new natural gas service," as goes the language of the consent decree, unquestionably allowed considerable latitude in determination of the base earning figure. This procedure is no less arbitrary than to say that a 7% return on a valuation of $55,000,000 will measure the base earning.

Mr. Fisher, the City's consulting engineer, has also implied publicly that the way to measure a base earning under these circumstances is in accordance with a given annual net revenue per customer meter. His suggested net revenue figure per gas meter for Detroit is $10.[9] To the writer this notion is arbitrary and insupportable. First, this idea ignores the varying proportion between companies of large and small customers or number of domestic and industrial customers. Also, if an additional investment is needed when larger sales may be made (Fisher approves promotional rates) to existing customers, and without an increase in number of meters, this measurement of the allowable return would either require frequent alteration of the net revenue figure per meter or otherwise such increases of sales would not be sought.

Contrasted with the "Washington Plan," for example, the "Detroit Plan" places no definite control on annual depreciation expense or the sum of the depreciation reserve. Here the Company's policy will be subject to confirmation or rejection in the annual audit. In fact the audit is relied upon for the control of all expenditures. The Gas Company has commonly made unequal annual allowances for depreciation and this point may conceivably become a basis of future dissension between the City and the Company.

Small domestic customers—cooking and hot-water heating buyers with an average consumption of 5 M.c.f. a month—will receive all the refunds. This singular feature is supposedly based on the conclusion that "industrial and commercial natural gas rates will adjust themselves to a highly competitive market whereas domestically used gas enjoys a virtual monoply."[10] This conclusion disregards the obvious fact that even gas sold for cooking purposes encounters competition. It would be more proper to say that competition is relatively greater and substitutes relatively more accessible to the industrial and house-heating customers.

Regulation in the gas industry as in any utility industry has always been more necessary where competition is least and substitutes least effective. It seems a suitable but arbitrary procedure, therefore, to give all the refunds to these domestic consumers. Other buyers may deserve some refund, but practicable difficulties hinder determination of a complex basis for refunds to all classes of customers. The prevalence of large industrial customers in Detroit makes undesirable a uniform refund to all types of customers like the rate reductions realized in non-industrialized Washington, D. C.

It may be argued that rate reductions instead of refunds ought to be given domestic customers. In

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[9] *At the time of adoption of the "Detroit Plan" the number of meters times $10 was about the same as the base earning of $3,850,000.*

[10] *John W. Smith, cited above.*

the interest of promoting additional sales to these consumers, it would seem desirable to give rate reductions since one customer's use of gas in the present does not foretell the refund which will make the cost of gas cheaper than the quoted rate. It is unlikely that customers will increase their purchase in the present because refunds may be obtained in the future. But the Company in the event that present divisions of excess earnings are retained would lose by rate reductions—its share in excess earnings of subsequent years might be smaller because of the effect of rate decreases on net income. The present plan, therefore, seems more favorable from the Company standpoint than if rate reductions were used.

Everything may proceed satisfactorily under this Plan until net income of the Company begins decreasing. Under the new rates for industries the prediction of a peak of 200,000,000 c.f. of daily sales may be achieved. But the one-industry City of Detroit suffers violent changes in industrial output during a business cycle, and because of this condition gas sales to industries and consequently net income of the Gas Company are subject to a precipitous decline. Again conditions in Washington, D. C., are dissimilar since governmental activity is likely to increase during a depression. It is not unlikely that at some time in the future net earnings of the Company may fall below $3,850,000. But no specific provision is made for rate changes no matter what the amount of the net earnings. When earnings do so fall, the Company may seek rate increases even though the base earnings is not guaranteed. Rate increases may be requested for service to small domestic customers because they are the ones who received all the refunds. Inflexibility of the rate structure of this Plan, consequently, may prove troublesome. Yet it does not seem desirable to use rate reductions instead of dividends in distributing excess earnings to domestic customers, because the former procedure would more clearly justify assessment of rate increases to these buyers when sales to other customers decline.

All of these questions may have been assumed to have been covered by inference in the three following paragraphs of the Court's decree:

> "Any terms of this decree may be modified or terminated by the Court upon application of either of the parties hereto and on a full and complete hearing upon said application.
> "It is the intention of the parties hereto that this Court shall hereafter be the forum for the determination of controversies which may arise between the parties hereto until such time as said parties shall discontinue the operation of this decree.
> "The Court hereby expressly reserves jurisdiction to make such orders or modifications of this decree as, from time to time, may be necessary in the premises."

As a solution for the many years of controversy about rates for small domestic gas customers the "Detroit Plan" was established. The briefness of the Plan and the consequent omissions represent weaknesses which may necessitate revision of the existing provisions. Selection of small domestic customers, for example, as receivers of all refunds, though other customer classes frequently need rate regulation, may occasion a request for rate increases on sales to these small customers if earnings fall below the base earnings figure. Variation in Detroit's industrial production makes this reduction in earnings possible. Like the "Washington Plan" and the sliding-scale forms of "automatic" rate control, no control of service standards is provided and the desirability of amortizing indebtedness with the Company's portion of the excess earnings is not considered. It does not seem, therefore, that the "Detroit Plan" is necessarily a permanent solution of the Detroit gas rate problem.

Scientific Gas Rate Facts

By
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IT is well known that, when determining the legal and permissible gas rate, the important consideration is whether the adopted rate nets the company a reasonable return on the investment and in consideration of the operating expenses.

However, in view of new law recently established by a few late decisions, several gas company officials have expressed a desire for scientific data verified by these latest and leading higher court decisions. They desire this data to contain references as to the proper and legal method of determining whether and under what circumstances the higher court will sustain a Public Service Commission's decision; when the rate established by the Public Service Commission is confiscatory; the part of the gas company's original investment including the construction cost that is considered; the part of gas company property considered for valuation and method of arriving at valuation; the kinds of expenditures allowable; the relation business depressions have on establishing rates; whether the legal expenses of contesting or resisting a proposed or adopted gas rate ordinance may be charged as company expenses; how to determine whether the price paid for gas to gas producers is reasonable; what part of rentals paid to keep leases alive is proper consideration, and many other important points of the law.

Citations Numerous

Therefore, in order that this article

shall be especially valuable, and may be retained indefinitely for further reference to ascertain dependable court citations, which may be desired by readers to verify certain points of the law, the explanation of the law will be concise and the court citations will be numerous.

Since reading court citations is dry and uninteresting, readers may omit them, except for reference to establish or verify the involved law.

Public Service Commission Appeal

Generally speaking, the sole method of review from an order of the Public Utilities Commission is by an appeal to a higher court. Ordinarily new evidence cannot be adduced upon the appeal, but other courts consider the law and facts presented to the Commission. Therefore, since the court usually will not consider new evidence but will refer strictly to the record presented and made before the Public Service Commission, it is essential that the latter shall conduct a fair and open hearing with suitable opportunity being given the company to challenge the result found by the commission. West Ohio Gas Company v. Public Utilities Commission, 294 U. S. 63; Ohio Bell Telephone Company v. Public Utilities Commission, 301 U. S. 292. Moreover, before a higher court may render its decision it must review both the law applied by the Public Service Commission and the evidence to ascertain whether the order of the Commission was "unlawful or unreasonable." Lima Telephone & Telegraph Company v. Public Utilities Commission, 120 N. E. 330; St. Clairsville v. Public Utilities Commission, 132 N. E. 151.

Generally, through a long line of decisions, it has been held that if the decision applied by the commission is erroneous, or if the facts found are manifestly against the weight of the evidence, the order should be reversed. Settle v Public Utilities Commission, 114 N. E. 1036.

In determining whether a rate is confiscatory, it is necessary for the court to examine the evidence anew and exercise its independent judgment. Ohio Valley v. Ben Avon Borough, 253 U. S. 287; Utilities Company v. Public Utilities Commission, 267 U. S. 359.

In other words, while the court usually will not consider new evidence it must thoroughly review all of the evidence considered by the Public Service Commission before it can decide whether the latter's order is valid or invalid.

Useful Property

Considerable controversy has existed from time to time as to what part of a gas company's property is useful and can be considered for rate-making purposes.

Various courts have held that while the standard fixed for determining rates is the cost of reproduction less depreciation, nevertheless for rate-making purposes only that property which is "used and useful for the convenience of the public" may be considered. Therefore, the court will decide whether the revenue raised by the rates gives a yield which is "something higher than the line of confiscation." West Gas Company v. Public Utilities Commission, 294 U. S. 63. This level always must be attained by giving suitable opportunity to the present company to submit evidence and argument. Southern Ry. Company v. Virginia, 290 U. S. 190.

On the other hand, a rate which would not be confiscatory in character, by reason of the amount being somewhat above the point of confiscation, yet might not be a reasonable and just rate as between the public and the gas company under all the circumstances of the case. Portsmouth v. Public Utilities Commission, 140 N. E. 604.

Cost of Operation

Usually, the gas company officials and the Public Service Commission do not agree upon the cost chargeable against labor and materials. It is well established that the Public Service Commission must determine whether or not the company's claim is too high and if so how much and whether the city's claim is too low and if so how much. Therefore, the trend of times must be considered. In other words, if the trend of labor and materials is higher, this fact must be considered, and due allowance must be made therefore because expensive and prolonged litigation cannot be resorted to every few months to change gas rates according to increased or decreased labor and material cost. For these reasons the courts hold that the rates established must provide not only a reasonable rate of return at the time of investigation, but also for a reasonable time in the immediate future. McCardle v. Indianapolis, 272 U. S. 400; Missouri Southwestern Company v. Public Service Commission, 262 U. S. 276; Bluefield v. Public Service Commission, 262 U. S. 679.

The courts must take judicial notice that there has been a depression, and that a decline in market values and cost of labor accompanied it or that there is an upward swing in business conditions and decide whether the established rate is in due and proper consideration of these facts. Topeka Company v. United States, 284 U. S. 248; Dayton Power Company v. Public Utilities Commission, 292 U. S. 290.

Obviously, it is a difficult matter to decide definitely and accurately upon the future trend of business conditions and the future cost of labor and materials, but nevertheless it is a necessary procedure when establishing gas rates. Some courts have held that the trend of increase or decline will be for one material or another, in this year or the next, can be known only to experts, who may even differ among themselves. Ohio v. Public Utilities Commission, 301 U. S. 292.

However, it is certain that the court will not take judicial notice of the fact that because there was for instance a ten per cent increase in the price of labor two years after the date of the investigation, such increase will continue throughout the period for which the rate is being fixed. While the court will sometimes consider testimony of experts who attempt to anticipate the future, yet since these persons widely differ in their opinions, and some recognized method must be arrived at in determining this question, the courts recently have adopted the rule that due consideration must be given to the trend and actual prices of labor and materials, and the income derived by the company, during the past two years. The most recent ruling of the Supreme Court of the United States is McCart v. Indianapolis 58 S. Ct. 324.

Speculative Allowances

It is important to know that annual allowances of depreciation are made for the sole purpose of maintaining the property in a normal operating condition, and to equalize the costs of retirements and replacements from year to year. United v. West, 280 U. S. 234; Lindeheimer v. Illinois, 292 U. S. 151.

Also, an allowance for depreciation must be made for the future as well as the past. While the history of the company's depreciation is a factor, it is not the sole one. And whether "going concern" value should be considered depends upon the financial history of the company. However, when substantial allowances for organization, interest, emergency and other general expenses during construction are made, a specific allow-

ance for going concern is not necessary. Hardin v. Public Utilities Commission, 162 N. E. 262.

On the other hand an allowance for the payment of federal income and state taxes must be made in all rate cases. Galveston, 258 U. S. 388.

Another important point of the law is that a court will not permit a Public Service Commission to overlook state excise taxes because of the assumption that business may improve in the immediate future.

For illustration, in East Ohio Gas Company v. Public Utilities Commission of Ohio, 12 N. E. (2d) 765, reported only a few days ago, February 23, 1938, it was shown that a Public Service Commission refused to consider certain taxes of a gas company on the contention that the improvement in economic conditions may result in increased sales for the gas company with resulting gains that more than offset the increased expenses of operation.

The higher court promptly overruled and reversed this decision, saying:

"Such a ruling is predicated upon a speculative assumption that neither court nor commission can make. To withhold a complete allowance for taxes because business may improve is mere guesswork."

Lease Payments

Operating expenses are to be based upon the management of property which is used and useful. When the nonproductive acreage is used for purposes of production, the costs incurred in carrying it during its nonproductive period may be capitalized. It is improper to consider such expenditures, which later are to be considered capital expenditures, as current operating expenses at this time.

Therefore, it is well settled that delay rentals paid by a producing gas company, to keep alive leases of gas land in reserve, should not be charged to operating expenses when an annual amortization allowance makes provision whereby new leases can be acquired and paid for out of current earnings. Dayton v. Public Utilities Commission, 292 U.S. 290.

With respect to the price being paid by the gas company for gas purchased, from producing companies the Public Service Commission is not bound by this price but it has the right to inquire into the reasonableness of the contract price. And, the test to be applied is whether the price was higher than that which would fairly be paid by a buyer unrelated to the seller and dealing at arm's length. Western Distributing Company v. Public Service Commission of Kansas, 285 U.S. 119.

Inquiry, of course, may and ought to be made of the valuation, revenue and expenses of an affiliated seller. Columbus, 292 U.S. 398; United Fuel Gas Company v. Commission of Kentucky, 278 U. S. 300; Smith v. Illinois, 282 U. S. 133.

Legal Expenses

Reasonable legal investigation, and other similar expenses are allowable. For example, in the recent case (12 N. E. (2d) 778), it was shown that a gas company expended $119,344 in legal and similar expenses to resist submitting to a city rate ordinance which the company contended established illegal and unreasonable gas rates. In indicating validity of these expenses, the court said:

"It was necessary for the company to seek a review before the commission unless it desired to abide by the ordinance rate which the commission thereafter found was unlawful and unreasonable. To show that the rate was confiscatory, evidence of valuation and operating expense had to be presented. . . . The entire rate-case expense was properly allowed."

Also, in Monro Gas v. Michigan Public Utilities Commission, D. C. 11 F. (2d) 319, 325; Mobile Gas Company v. Patterson, D. C. 293 F. 208, modified on other grounds in 271 U.S. 131.

To Summarize

A review of all recent higher court cases shows that the law is well settled that: (1) It is the duty of the court upon a review of orders of the Public Utilities Commission not only to determine whether lawful rules were applied by the commission, but also to decide whether upon the record the orders made were against the weight of the evidence or resulted in confiscation of property. (2) Where in fixing valuations of a gas producing and selling company the commission adopted some views of each side and also made separate findings of fact, such procedure is not unlawful or unreasonable provided its independent judgment was based on evidence in the record and was not against the weight of the evidence. (3) A rate of return must be based not only on the valuation, revenue, and expenses but must likewise provide for a reasonable return in the immediate future. (4) Methods of the commission in ascertaining valuations and depreciation will not be disturbed if they are fair and opportunity to challenge their reasonableness upon review is provided. (5) Annual allowances of depreciation are made for the purpose of maintaining the property in a normal operating condition, and to equalize the costs of retirements and replacements. (6) An allowance for going concern value should not be made upon remote assumptions and speculations and without proof of any intrinsic worth not included in other property valued. (7) An order permitting only such deductions for taxes, as are based upon the amounts appearing on the books of the company during a test period, is unlawful and unreasonable when the evidence discloses that the rate of taxation was higher in years subsequent to the test period. (8) Under a plan whereby a public utility company expends sums to enable its employes to purchase stock or otherwise benefit in the parent company, if the plan is a fair one and if the employe treats the expenditures for his benefit as part of his compensation or salary, such sums are to be considered operating expenses. (9) Delay rentals paid by a producing gas company to keep alive leases of gas land held in reserve should not be charged to operating expenses when an annual amortization allowance makes provisions whereby new leases can be acquired and paid out of current earnings. (10) Where a gas company purchases a portion of its supply from an affiliated producer and seller, the commission may inquire whether the contract price of sale is fair and reasonable. Not only can inquiry be made of the valuation, revenues, and expenses of the affiliated company, but evidence of the market price of gas at the place of sale and delivery is also relevant to determine whether the contract price is reasonable. (11) Legal expenses of a gas company, in resisting a rate on the ground that it is confiscatory, may be amortized as part of its operating expenses when the evidence produced resulted in a finding that the rate proposed was unreasonable and unlawful.

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NOTE TO READER: This is the fourteenth in a series of advertisements dramatizing one engineer's experience with his first Dresser-coupled line. For the complete story, write for Bulletin 351.

Pipe Corrosion & Coatings

Types of Coatings
(Continued)

By Erick Larson

Part 22

Petrolatums

PETROLATUM pipe coatings are basically a refined petroleum product containing no asphalts or coal tars. An oxidation inhibitor is usually included in a petrolatum. Chromium compounds are preferred as inhibitors rather than silicates. The reaction of petrolatums is neutral or slightly alkaline. The term "greases" has frequently been applied to petrolatums being descriptive of the general feel and appearance of the material.

History

The use of various products derived from the refining of petroleums for the protection of pipe lines from corrosion is almost as old as the use of petroleum. Development of the particular products of petroleum distillation most effective in corrosion mitigation occurred gradually. The first inclusion of inhibitors in the petrolatums was in 1916. This mixture was first applied to oil lines and in 1918 to gas lines.

The use of a wrapper in connection with a commercially produced petrolatum including an inhibitor occurred in 1921 although many locally composited petrolatums had been protected by a shield previous to that time.

Availability

The source of supply of the raw material for producing petrolatums will be practically unlimited as long as petroleum is available and will result in a constantly available finished product at a reasonably and fairly stable price.

Ease of Application

The ease and convenience with which petrolatums may be applied is one of the outstanding features of this type of coating. They may be brushed, sprayed or rubbed on. The material readily lends itself to application by machine or dipping. In ease and convenience of application this type of coating may easily be classed as first among those in general use at present.

The petrolatums may be secured in any degree of fluidity varying from liquid to about the consistency of cold lard. Purpose, temperatures and method of application affect the decision as to the fluidity desired. In the field the common method of application is by hand rubbing and therefore a consistency approaching soft butter, is desirable. Machine application produces a thicker layer than secured by the rubbing method as a stiff consistency requiring heat to produce fluidity is used.

Non-Drying

Petrolatum types of coating remain in the state of plasticity which they attain immediately after application practically indefinitely. The non-drying characteristic theoretically allows the inhibitor to function properly for long periods. The mobility of the non-drying coating, it is contended, allows the material carrying the inhibitor to slowly penetrate even the minutest of spaces. If a scale should become loosened from the pipe surface, the inherent mobility of the material will result in the newly exposed surfaces being coated. This action extends to the closing or sealing of any exposure of the metal caused by cracking or breaking of the coating resulting from external forces. This action may be compared with the alleged self healing of harder coating only the action is more pronounced.

Another contended advantage of petrolatums is that being non-drying the compound is more stable than those depending upon oxidation or evaporation for curing. The common types of hot applied coatings are practically completely cured after cooling.

There is some question as to these contended advantages resulting from the non-drying characteristics of the material being applicable to the hot applied petrolatums. For instance where a petrolatum was hot applied at the mill and a wrapper used, examination of the pipe was made just before installation. On removing the wrapper, small obvious pin holes were frequent in the coating some of which penetrated to the pipe surface. No self healing action had occurred. These pin holes may have been due to a lack of proper methods of or carelessness during application but nevertheless the pin holes remained.

The added thickness of mill applied coats made the result of physical forces including impacts and soil stress much more obvious than with the thinner applied material. The resistance of physical forces of a non-drying coating is naturally less than is furnished by harder types and produces a reason for the greater damage experienced from these forces when petrolatums are used. Therefore, pipe coated with petrolatum even when shields are used must be handled with a greater degree of care than the hardening variety of coatings.

Physical Resistance

The exercise of proper care during transportation and installation will avoid thinning of a petrolatum coating in localized areas. The real difficulty is to protect such a soft coating from the effects of soil stress. This destructive force may not completely remove all petrolatum but will leave such a thin layer that the protectiveness of the coating in that area will be no greater than a thin paint film. Localized corrosion has been observed in many instances where the remaining portions of the unshielded petrolatum coating were undisturbed. Factors such as the action of bacteria were practically excluded by selecting for observation petrolatum coated pipe lo-

cated in rather dry gravel soils where soil stress was particularly noticeable on the hardening types of coating.

Another physical force which is destructive to soft coatings is that produced by roots. Examinations were made of petrolatum protected pipe buried in extremely destructive muck soils, the site being a tidal marsh consisting of extremely acid black muck, heavily charged with hydrogen sulphide and salt water. A marsh grass —Phragmitis Communis—or reed grass growing 8 to 12 ft. high flourishes on this soil. The trench soil is a mixture of sand, gravel and muck with the muck predominating. The 2" pipe joints were protected by a coating of petrolatum, a petrolatum impregnated organic wrapper and an extra layer of coating on the outer surface of the wrapper. The joints had been buried for 3.6 years when examined. Illustration No. 1 shows roots of reed grass growing into the protection at the pipe joint. Illustration No. 2 shows the same joint with the outer wrapper partly removed and illustrates a root growing concentrically with the pipe and between the wrappers. Illustrations Nos. 3, 4, 5 and 6 are of the same type of wrapper and show how the root penetrated through three wrappers to the pipe. The black areas in illustration No. 3 are darkened by the residue of the outer wrapper. This root in illustration No. 3 did not go through weak or partially decomposed wrapper but directly through unaffected sections. The material surrounding holes in the wrapper is weakened and portions rotted. Shallow pits were found on the pipe.

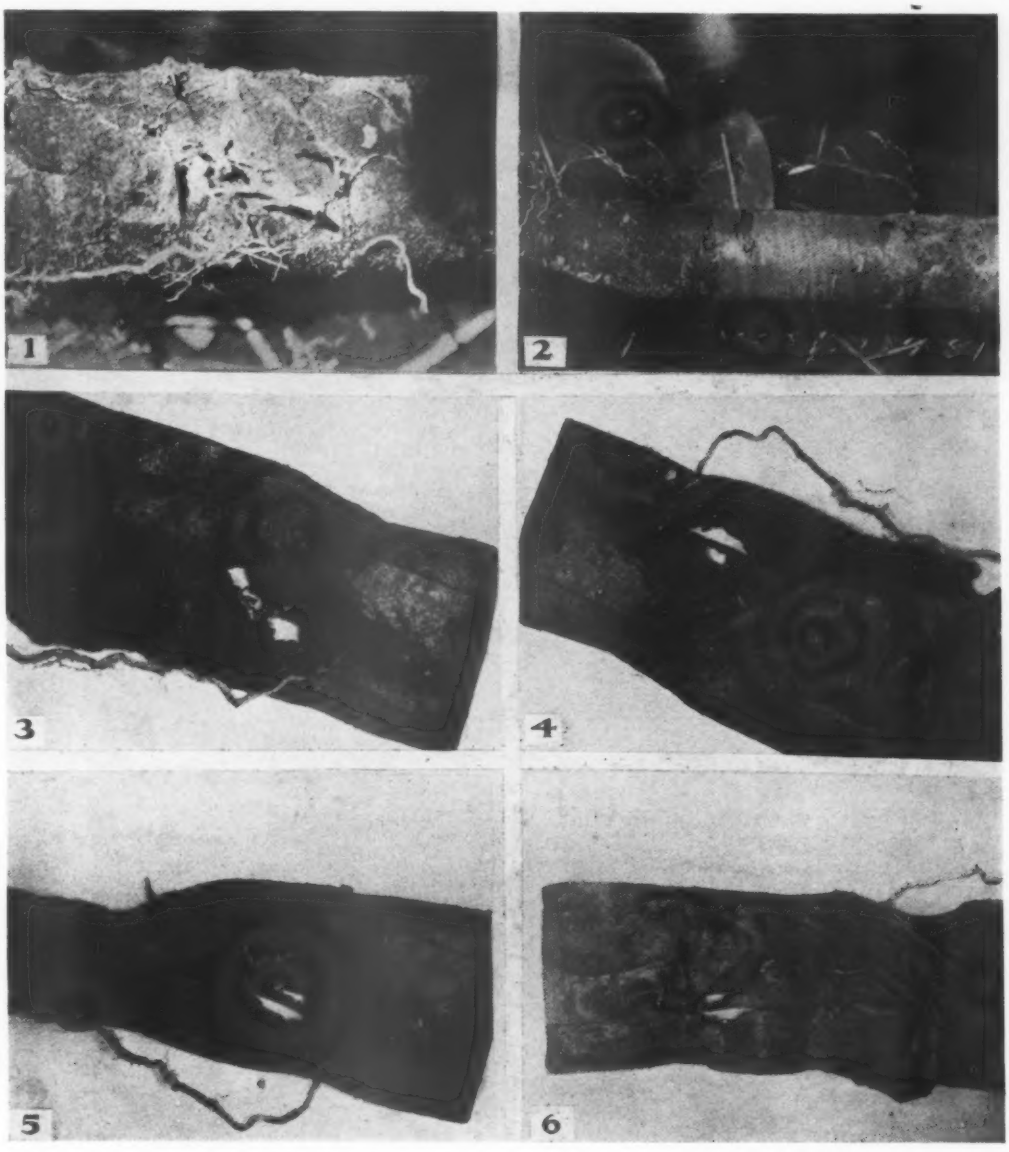

Fig. 1. Roots of reed grass growing into protection at joint. Fig. 2. The same joint with outer wrapper partly removed shows root growing concentrically with the pipe and between the wrappers. Figures 3, 4, 5, and 6 show same type of wrapper and how the roots penetrated through three wrappers to the pipe. Black areas in illustration 3 are darkened by the residue of the other wrapper.

As a general conclusion, the corrosive resistance prop-

erties of unshielded petrolatums are more susceptible to destruction from soil stress than the same property of any other coatings and shielded petrolatums are more susceptible to loss of resistance than shielded coatings of the hardening type.

Temperature Effects

Low temperatures apparently have no effect on the value of petrolatums as corrosion protectants. The adverse effects of the higher temperatures normally encountered result from the low flow and melting points of the material.

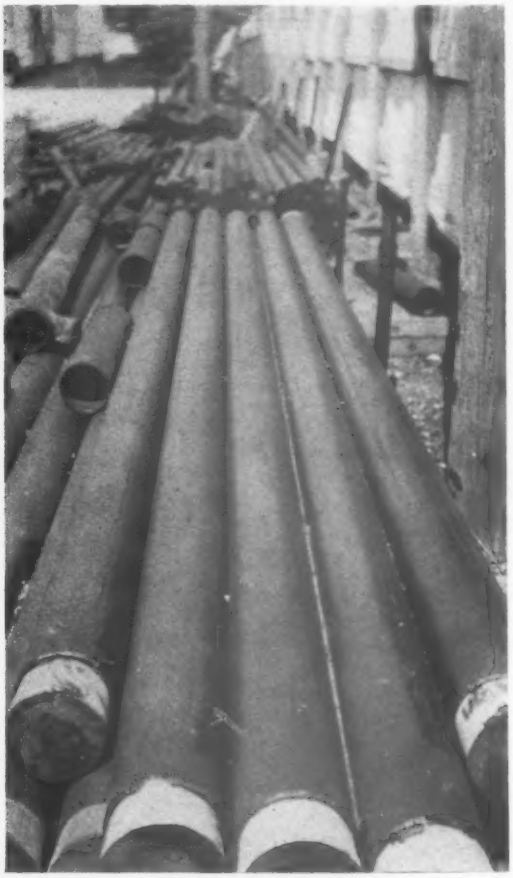

Fig. 7. Hand applied petrolatum on 6" pipe. Note slight flow of material has sealed space between two pipes after nine months exposure in a northern climate.

Temperature is sometimes said to be the cause of failure of coatings applied to protect against atmospheric corrosion when actually the causes are certain rays in sunlight. This type of action has been frequently observed on the type of petrolatum used for mill priming. Petrolatum mill primer is applied in an extremely thin layer and dries so that the surface is neither sticky nor tacky. The storage of such primed pipe, even in colder climates, in such a manner that part of the surface is exposed to sunlight results in streaks of corrosion forming to present the appearance of parallel ringlets about the circumference of the pipe. The pipe surface not exposed to the direct rays of the sun will ordinarily be protected by the mill petrolatum primer for at least four to six months while the exposed areas will corrode in one to two months.

The petrolatum applied by hand rubbing appears to provide protection from atmospheric corrosion for a period adequate for all practical storage periods. The surface of the rubbed on coating appears to harden and form a thin shield. This may be partly due to dust being absorbed by the surface layer and acting as a filler. Cracks frequently appear in the skin thus formed but the newly exposed material soon hardens. The extent to which the skin cracking occurs has not been observed as causing any appreciable decrease in the effectiveness of the coating. Beneath the skin the petrolatum remains in the state it was when applied.

Temperatures of 70 to 80 degrees F. cause a slow flow of petrolatums. This flow is evident where pipes are stocked so they touch each other and the valley between gradually becomes sealed at the bottom. When pipe temperatures rise above 90 degrees F. the flow of the material causes a gradual but noticeable thinning. The cracking of the surface skin becomes more frequent above 90 degrees F. due to the weight of the material breaking the skin and eventually the pipe surface is exposed. The bond between the pipe and material is weaker than the cohesion between particles and thus when petrolatum coated pipe is stored in contact or flow of the material causes contact, removal of the pipe may result in the coating partially or wholly peeling off.

The effect of temperatures above the flow point on petrolatum coatings applied by dipping or on the thicker layers of mill applied coating, is a peeling rather than a flowing action. A skin forms as previously mentioned. It is believed that this skin acts to some extent as a heat insulator. Pipe in storage even with the ends plugged will gradually absorb heat and eventually reach a temperature which is above the flow points of the petrolatum. The external skin ruptures when the weight of the flowing material becomes excessive and only a very thin layer remains over the pipe surface. This thin layer acts as did the mill applied primer. After the skin has ruptured the coating peels off in a form similar to parings from an apple.

Ground temperatures seldom rise above flow point temperatures and therefore there is practically no effect from heat after installation. A difficulty however, is that the effect of heat above the surface is sometimes not obvious and thus not repaired. The difficulty is particularly true of rubbed or brushed on petrolatums.

Bond

The lack of any tensile strength in petrolatums precludes evaluating bond strength by the unit tension required to produce a rupture of the bond.The desire for some method of evaluating the bond of a petrolatum to metal has led to the suggestion that the abrasion which petrolatums withstand may be a criterion. During several inspections of unshielded petrolatum coated pipes which had been in a moist loam for three years, an attempt was made to remove the coating by abrasion. Sand and water were mixed and vigorously rubbed along the pipe with waste. When appearances indicated the pipe was clean the sense of feeling assured the presence of a greasy substance and heating clearly showed a thin layer of petrolatum. While this film of petrolatum remained and demonstrated the adhesiveness of the coating the thin layer remaining after the abrasive action was entirely too thin to serve as a protection from corrosion.

The difficulty of removing the petrolatum by abrasion was demonstrated by the fact that at some places the metal surface had actually been polished by the severity of the abrasive action. Under ordinary circumstances a metal polished by sand would indicate oxidation by a discoloration in a comparatively short time, particularly

when moistened. In this instance the film of petrolatum delayed noticeable oxidation for slightly more than an hour.

The rupturing of the bond between petrolatum and metal by soil stress has been observed in numerous instances. Pipe protected by rubbed on petrolatum but unshielded and installed in a heavy gravel had pits in excess of ten mills within a year. These facts also add to the weight of evidence favoring the shielding of all present day coatings.

Securing a good bond between a shield and a petrolatum is difficult. The shield is applied to the pipe when the petrolatum is cold or with hot application at least the temperature is insufficient to melt the impregnating material in the shield. The lack of fluidity of the coating in both instances results in a shield spanning some areas of coating. Instances have been observed where the bond between shield and petrolatum was sufficiently strong so that the asbestos wrapper parted internally when an attempt was made to remove it from the pipe. This superior bond was mostly along the area beneath the overlap of the wrapper or where additional compression occurred during application.

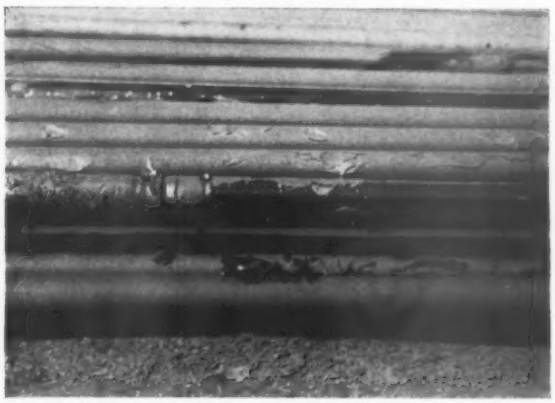

Fig. 8. Pipe coated with petrolatum by dipping pipe stored in open from March 23rd to July 15th in northern climate. Note how petrolatum peels off in sheets leaving a thin layer over the pipe surface. Note crack commencing in middle on right side.

The pouring of mill applied petrolatum in two layers has been tried. It has been found on several such trials that the initial coat is only bonded to the second coat over approximately two-thirds of the total area. This was determined by unwrapping the wrapper and noting the area where the parting occurred in the petrolatum and at the plane between the two layers.

The bond of petrolatums to either the pipe or shield is not as important a factor as the maintenance of a uniform and suffiicent thickness.

Thickness

Attempts have been made to establish a general rule for a minimum thickness of coating which would be applicable to all types and still provide adequate corrosion protection. Tests on a number of basic materials established the conclusion that a thickness less than 5 mills was inadequate. Some lacquers showed a high degree of resistance but are more adaptable to locations where the metal may be observed and frequently repainted.

Thickness does depend to a considerable extent on the use. The use of a film coat of petrolatum on pipe to be used inside of buildings provides excellent protection from corrosion both before and after installation if not stored in or exposed to the sun. A petrolatum coating does not gum up the dies of threading equipment.

An examination of 2" O.D. pipe which had two layers of poured petrolatum, an asbestos wrapper and an X coat of petrolatum applied at the mill disclosed the following thicknesses of coating and wrapper—0.210", 0.222", 0.198", 0.194", 0.173" and 0.208". Measurements were made just previous to burial and were taken at random on several hundred feet of pipe. No measurements were made where the wrapper was lapped. The thickness at the time of installation is important as changes may readily occur in the interval between application and burial. The thickness of the wrapper must be deducted when considering the thickness of a coating. In this instance the wrapper was comparatively uniform in thickness and therefore the considerable differences are attributed to the coating itself.

Providing a petrolatum coating in excess of five mills in thickness results in difficulties with handling and wrapping. The softness prohibits maintaining a uniform thickness.

Soil Stress

A requisite for resistance to soil stress was mentioned as hardness. The non-drying character of petrolatums precludes possession of hardness. Wherever soil stress exists a petrolatum, whether protected with a flexible shield or not, is classed as weak. The use of a concrete, cement or some metal shields would provide adequate soil stress resistance.

Porosity

Porosity has only been observed in mill applied and dipped petrolatum coatings. The discovery of porosity beneath a shield by electrical methods is difficult as the impregnated wrapper possesses a high dielectric strength. Occasional tests should be made by carefully removing the shield by pouring warm water over the exterior. The mill application methods make use of two layers of petrolatum. The second layer will often be found to have pores. There is seldom any uniformity to the distribution of the pores. As with other coating materials the cause is not inherent in the material but appears to be more difficult to eliminate. Heating of a petrolatum causes a foam to form even at temperatures required for application. This foaming may be the cause of porosity in the second coat. Any pores which may have formed in the initial layer are not detectable following application of the second coat unless they coincide.

In machine application and also where the petrolatum is poured on care must be exercised to prevent mixing with air. When there is a slight agitation of a petrolatum it rather readily absorbs air which disperses throughout the material in small bubbles. These bubbles may be the cause of porosity in the finished coating.

Application by dipping increases the possibility of pores penetrating to metal as usually only one dip is made. Lifting the pipe out of the liquid material results in some of the coating material being aerated. The action of dipping the pipe into the liquid causes formation of a foam which must be continuously removed or the porosity will be severe.

Porosity is not found on rubbed petrolatum coatings but holidays are not infrequent. The frequency of these holidays is entirely dependent upon the care exercised during application.

Absorption

Greases naturally repel moisture. This characteristic of petrolatum is one of the most important advantages which can be possessed by pipe coatings.

The repulsion of moisture has led to the common use of petrolatums for the field joints of pipe lines particularly when the work must be continued in wet or damp weather or moist trench conditions. The rubbing of the petrolatum over the wet surface of a pipe is common practice. Apparently the moisture is completely removed from the pipe surface during application.

The examination of such joints by electrical holiday detectors has revealed dielectric weaknesses more frequent on the pipe which was moist during application than those which were dry. Further study reveals that petrolatums do repel moisture but in so doing may segregate globules of moisture within the body of the material. These water inclusions may precipitate on the pipe surface or within the material. In the latter instance pressure may gradually force the water to the pipe surface or the coating break down due to inadequate thickness. Application procedure should be carefully watched to guard against the physical mixing of water with the petrolatum. Thorough rubbing may solve the problem and retain the advantage of being able to apply in all atmospheric conditions.

Dielectric Strength

Laboratory tests on petrolatums only three mills in thickness indicated they possess adequate dielectric strength. Therefore, petrolatums can be inspected by electrical testing methods. There has been a tendency not to use electrical holiday detectors on petrolatums due to the greasy character of the material apparently allowing uniform distribution. However, coatings of all types should be subjected to holiday tests so as to avoid attributing any failure to the material.

The shield on a petrolatum may have a rather high dielectric strength and initially pass a severe test for holidays. Experience has indicated a lack of permanency in the dielectric strength of practically all shields. Therefore a spot check of shielded petrolatums should be made with the shield removed.

A slight blow on the shield above a petrolatum coating as with the rounded end of a ball peen hammer is frequently sufficient to cause a holiday to be indicated by a detector. This fact is mentioned as impacts equivalent to such a blow are not uncommon and may be the use of incomplete protection. These conditions have been found on mill applied and dipped petrolatum coatings as well as on wiped applications.

Toxic Properties

Roots have been mentioned as attracted to petrolatum coatings. Materials toxic to plant life have been incorporated in petrolatum coatings with no apparent effect on plant life. Whether the reason was an insufficiency of the toxic materials, unequal distribution, the ability of roots to select food or some other unknown cause was not determined.

Fillers

Experiments, though no complete research, have been made with fillers in petrolatums. The tentative conclusion was that more disadvantages than advantages resulted. The filler caused a stiffening of the coating which made application more difficult. A thicker coating was required to secure an equivalent dielectric strength. The filled petrolatum in a dipping tank required stirring which produced an excess of foam.

Effect on Other Coatings

The common use of petrolatums for field joints in connection with coatings of other types on the remainder of the pipe has raised the question as to the results of such combinations. As a general conclusion the petrolatums do not affect other coatings nor decrease the corrosion resisting properties of those coatings. A slight modification may occur if an excess of thinner is used to provide greater ease of petrolatum application in extremely cold weather. The thinners may be solvents of the other coatings. The slight amount of coating dissolved and thereby possibly dispersed in the petrolatum would seldom be harmful to the corrosion resisting properties of the protection.

The petrolatum has an advantage over most other types of coatings as it may be applied over slight rust films, primers for other coatings or pipe which has been cleaned only by wiping and yet provide an initially good protection against corrosion. The petrolatum may frequently be found beneath the film of other types of primers. Penetration to the pipe may be due to minute defects in the primer or the primer material may be permeable by the petrolatum. Some types of porous coatings absorb part of the petrolatum while on others the grease merely remains as a surface coat.

The effect of an inhibitive petrolatum on rust depends upon the quantity of iron oxide. Scaly rust would not be allowed to remain on a pipe before applying a coating. However, tests on extreme conditions have included the application of a petrolatum over heavily scaled rust. The petrolatum appears to readily penetrate all interstices between the scale and the uncorroded metal. The scale may gradually become loosened and the coating is usually found beneath the scale.

Applying a petrolatum above slight speckled rust and after a period of time removing the coating has disclosed a bright finished metal. This is also true when oils and foreign matter have covered the pipe before the coating is applied. The petrolatum appears to break the bond to the pipe of light rust or foreign matter and at least for a time protect the bright surface from tarnishing.

Some reports have indicated a discoloration of the pipe beneath petrolatums although the progress of the action has not been sufficient to claim that such discoloration constitutes practical failure of the coating. Discoloration may be significant during an accelerated test but its presence after comparatively long periods of service should not be taken as indicative of coating failure unless pitting is observed.

Effect of Bacteria

Both aerobic and anaerobic bacteria have been observed to affect petrolatums. The action appears in small areas. The wrapping material and coating gradually disappear and pitting progresses rapidly. The coating and shield surrounding the pitting frequently appears to be in a condition identical to that when installed. This action has been observed, although less frequently, in the comparatively dry soils as well as in extreme wet conditions.

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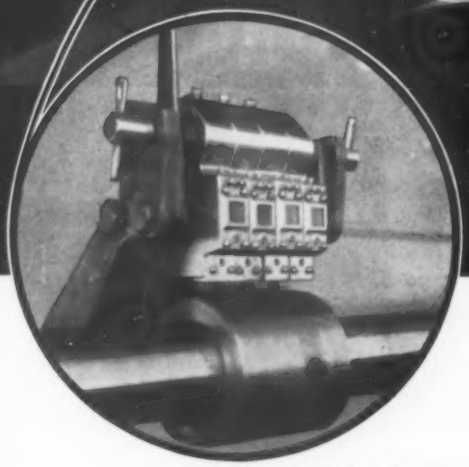

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STOP CAST-IRON JOINT LEAKAGE

the Inexpensive Way

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Trade-Mark

THE use of Carboseal anti-leak has become a routine procedure in the maintenance programs of over 200 gas companies. Many utilities have completely treated their entire distribution systems. Nation-wide experience indicates that the average cost of Carboseal anti-leak required per mile of 3-inch equivalent cast-iron main is under $100. Savings in terms of gas formerly lost have shown returns of 49 to 500 per cent on the investment.

Carboseal anti-leak corrects leakage in dry-gas distribution systems by permanently moistening and swelling the jute in cement or lead-caulked bell and spigot joints. Joints treated five years ago, and in contact with dry gas since then, remain 100 per cent tight on the soap test. Meter tests made on cast-iron mains, where no services were connected, showed complete elimination of leakage after Carboseal anti-leak treatment. Tests on mains with connected customers showed leakage reductions from 50 to 95 per cent after this treatment. In general, any remaining leakage was in the services.

From 2,000 to 5,000 feet of main a day can be treated without interrupting gas service. Carboseal anti-leak contains no volatile diluents which evaporate, and costs much less to apply than other lasting methods of stopping cast-iron joint leakage.

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CARBIDE AND CARBON CHEMICALS CORPORATION

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PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

Fifteenth Annual Distribution Conference

The Fifteenth Annual Distribution Conference of A. G. A. opened April 4th at the Netherland-Plaza Hotel, Cincinnati, O., with H. L. Gaidry, chairman, presiding.

H. C. Blackwell, president, Cincinnati Gas & Electric Co., welcomed the delegates. Alexander Forward, managing director, American Gas Association, in a brief address, stressed the necessity for all those interested in the gas industry to get together, and pull together for the best interests of all.

F. M. Goodwin, chairman of technical section, presented the first paper. He emphasized the importance of the work being done by the several sections of the A. G. A. and stated:

"The distribution engineer, in order to keep up to date, should be conversant with the activities of the production and chemical committees within his own section and the work of the industrial section, the commercial section, the gas appliance and equipment manufacturers, the A. G. A. laboratories, and some of the many committees which have such projects 4-3 and Z-21, the domestic gas range research committee and the natural gas department."

Monday afternoon was devoted to three round table luncheon conferences, all of which were well attended.

Tuesday morning Hugh Cuthrell, president, Gas Exhibits, Inc., explained the activities of the gas industry in connection with the New York's World Fair 1939.

The report of the committee on pipe coatings and corrosion was presented by A. V. Smith, chairman. Dr. Scott Ewing, research associate of National Bureau of Standards, read a paper on "Recent Developments Relating to Soil Corrosion and Pipe Coatings."

T. J. Perry, the Brooklyn Union Gas Co., Brooklyn, N. Y., presented a paper dealing with installation and service experiences with commercial refrigeration. A paper by E. W. Christell, Peoples Gas, Light and Coke Co., Chicago, entitled, "Servicing Domestic Appliances," will be found in this issue of the Journal.

"The Odorization of Natural Gas in the Southwest," was the subject of a paper presented by E. L. Henderson, chief engineer, United Corp., Houston, Texas. Abstract of this paper appears in this issue.

"The Chemists' Place in the Distribution Department," was the title of a paper presented by G. E. Ludwig, Grand Rapids Gas Light Co., Grand Rapids, Mich.

A paper entitled, "The Economy of Metering," was presented by D. P. Allen, Washington Gas Light Co., Washington, D. C.

A paper by M. E. Shea, Roanoke Gas Light Co., Roanoke, Va., entitled, "Introduction of Tetralin into a Distribution System by Portable Equipment," is printed in full in this issue of the Journal.

Numerous committee reports were presented and the meeting closed Wednesday with an open forum at which subjects introduced from the floor were discussed, and a presentation and discussion of summaries of the round table luncheon conferences held Monday afternoon.

Attendance at the conference was about 400.

The Odorization of Natural Gas in the Southwest*

By

E. L. Henderson

Chief Engineer
United Gas Corporation
Operating Division
Houston, Texas

FOLLOWING enactment of a law requiring that natural gas be odorized, the Railroad Commission of Texas issued their rules, regulations, and order, effective July 27, 1937, outlining the manner in which gas companies should odorize their gas. Some of the more important requirements of the rules and regulations are that:

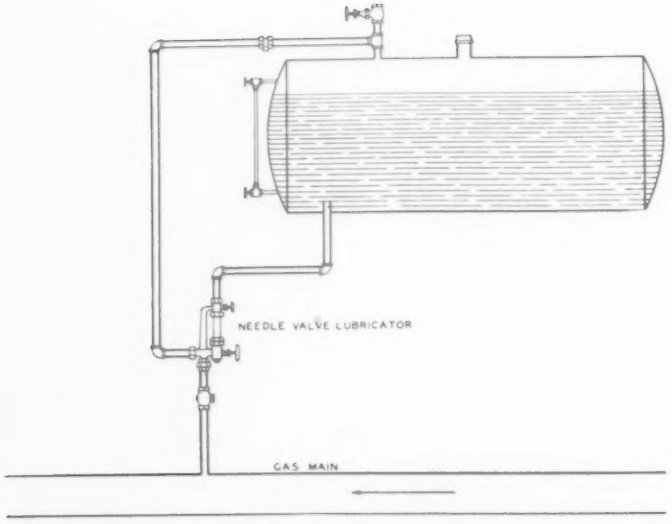
1. Odorization is not required for gas used in natural gasoline extraction plants, carbon black plants, natural gas gathering lines, in repressuring gas wells, or gas used in lease and field operations such as firing engines and boilers used for drilling, gas engines in compressor stations, and other similar uses. However, all domestic gas used in lease houses, offices, warehouses, camps, etc., must be odorized.
2. All gas conveyed by pipe lines within the limits of any city or town for purposes of distribution and sale in said city or town shall be odorized; but odorization of the gas in the transmission lines outside cities is not required by the order.
3. The malodorant agent used must be harmless and neither toxic nor nauseating; it shall be non-corrosive to steel, iron, brass, bronze, or leather, and it shall be insoluble in water.
4. The products of combustion from the malodorant shall be such that they are neither toxic nor nauseating to a person breathing air containing these products of combustion, and the products of combustion shall also be such as not to corrode or be harmful to the normal materials with which these products of combustion would come in contact in places where the gas is burned.
5. The malodorant agent to be introduced into natural gas shall be of such character as to indicate by distinctive odor the presence of gas when such gas is present (mixed with air) in concentrations of not greater than 1% by volume.
6. Plans and specifications of equipment, as well as specifications of the odorant and amount of odorant to be introduced, must be approved by the Commission.
7. All gas consumers must be notified in writing at least three days prior to the beginning of introduction and continuous use of malodorant.

The reports and statistics which are being received by the Railroad Commission present some interesting facts regarding the practice in Texas. Their records show that the following warning agents are being introduced into natural gas:

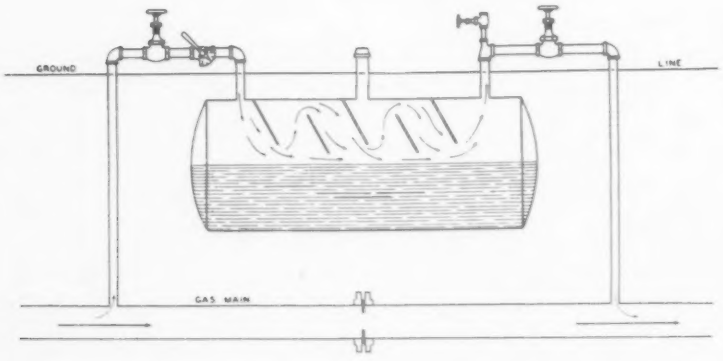
1. Calodorant—a complex mixture of hydrocarbons and organic sulphur compounds manufactured by the Standard Oil Company of California.
2. Pentalarm—composed principally of amyl mercaptan, manufactured by the Sharples Solvents Corporation.
3. Ethyl mercaptan.

A few wells in Texas produce natural gas with sufficient sulphur content that the odor has been approved

** Abstract of a paper presented at American Gas Association Fifteenth Annual Distribution Conference, Cincinnati, Ohio, April 4, 5, and 6, 1938.*



DRIP TYPE ODORIZER



PROPORTIONAL ABSORPTION TYPE ODORIZER WITH BAFFLES

by the Railroad Commission without any warning agent being added. All companies except one use either Calodorant or Pentalarm. At Port Arthur there are large oil refineries from which vapors so permeate the atmosphere with an odor similar to gas or gasoline that it was considered advisable to use ethyl mecaptan as the warning agent. The odor of ethyl mercaptan is not nearly so similar to the ordinary oil refinery odors as those of Pentalarm and Calodorant.

For the quarter ending December 31, 1937, the reports showed Calodorant was used at an average concentration of about two gallons and Pentalarm at an average concentration of about one pound per million cubic feet. Ethyl mercaptan was used in Port Arthur at a concentration of 1.03 pounds per million cubic feet.

The reports received from the companies regarding their first sixty days of operation after beginning odorization showed that for thirty-eight companies serving 308 towns, comprising approximately 187,000 customers, complaints were received from customers which resulted in the repair of the following number of leaks:

Mains	121
Service Lines	625
Meters and Loops	1,798
House Piping	4,350
Appliances	8,198
Total	15,093

These figures do not represent all companies, but do give a cross-section of what can probably be expected on the average. This shows that one leak was reported for each 12.4 customers.

In November, 1937, the Commission ordered all gas companies to conduct room tests in each community which would show the amount of gas necessary to be admitted into a room in order for the odor to be readily detected. In most instances five witnesses were used and a procedure followed which showed the per cent relation of the volume of gas to air in the room. Several hundred of these tests have been reported, and although there is considerable variance in the results, in the majority of cases a gas-air mixture of from one-tenth to two-tenths of one per cent was readily detected by the witnesses where Calodorant was used at two gallons and Pentalarm at one pound per million cubic feet.

The natural gas which we distribute is explosive when mixed with air in a proportion of 4% and more. These figures seem to indicate that we are operating at a very comfortable factor of safety. Upon investigation we find that most companies in the Southwest are using the warning agents in about the same concentrations as stated above.

According to the present practice in the Southwest, Calodorant and Pentalarm are costing less than one dollar per million cubic feet of gas treated.

The apparatus in use in the Southwest today can be divided into two general groups: (1) equipment which injects the fluid into the gas stream, and (2) equipment in which the fluid vaporizes and the vapors are carried off by the gas.

Figure 1 illustrates the simplest drip type apparatus. Adjustment of the needle valve on the sight feed will determine the drops per minute or rate of input of the fluid.

Figure 2 illustrates a device installed so that by proper adjustment of the precision valve in the by-pass line, a correct proportion of the gas passes through the tank partially filled with the fluid. At ordinary temperatures and pressures a very small percentage of the total is by-passed. For convenience in refilling or gauging the tank, other valves are provided for shutting gas off from the tank without disturbing the setting of the precision valve. Various means are employed to create a differential pressure across the tank. An orifice plate or gate valve can be used as well as a pitot tube arrangement at each inlet and outlet connection. In fact, the quantity by-passed is so small that in many cases simple full-flow connections without a restriction between them have been found to give reasonably good performance.

More uniform absorption of the vapor takes place if some means is provided for agitation or a more intimate contact of the gas with the liquid.

Introduction of Tetralin into a Distribution System by Portable Equipment*

By
M. E. Shea
General Superintendent
Roanoke Gas Light Company
Roanoke, Virginia

IN DISCUSSING the use of tetralin, recognition should be given the fact that this product has relatively little acquaintance in the American gas industry. It has been used in a number of manufactured gas cities, in the United States, but only thirty-six companies use it regularly. To the best knowledge of the author, only ten articles concerning the properties and use of this solvent, as affecting gas distribution have been printed for American engineers. Several publications[1, 2, 3, 4, 6, 7] report on successful processes in Europe, using tetralin for absorbing naphthalene produced in coal gas, as well as for removing old deposits in distribution systems. One article[8] describes a tetralin purifier, developed in Canada. The other published reports[5, 9, 10] review European experience and literature and comment on the physico-chemical properties of tetralin, its effect on meter and governor diaphragms and its general theoretical advantages and limitations. Though used to a limited extent in this country, a report of a successful American experience with tetralin is conspicuous by its absence. Earnest study has been devoted to the use of tetralin for cleaning distribution systems of gum and naphthalene deposits in Continental countries, and a most complete bibliography of these experiences is contained in the American Gas Association Chemical Committee Report[10] of 1933. Although tetralin was not available at the time, the method of using a solvent suggested by Eitner[6] in 1899 is now successfully followed by over two hundred gas companies in Europe.

In view of our restricted familiarity with both the methods and the product, it seems advisable before discussing its performance, to outline the requirements of a suitable solvent for naphthalene deposits, and the properties of the one to be discussed. According to the findings[6] of several authorities, a solvent to be generally adaptable to successful naphthalene mitigation, should possess all or most of the following characteristics:

(A) The ability to absorb large quantities of naphthalene at low temperature.
(B) A vapor pressure within limits sufficiently low to insure easy vaporization and not too high to keep the solvent in a permanent vapor state.
(C) Be insoluble in water.
(D) Have little or no effect on the heating value of the gas.
(E) Be inexpensive to use.

Tetralin (registered trade mark), chemical formula $C_{10}H_{12}$, as marketed in the United States, is a water-white liquid, the result of catalytic hydrogenation of pure naphthalene. Its ability to chemically absorb naphthalene is claimed by some to be greater than that of any other solvent, and by others[6] not as great as xylene or benzene. The two solvents mentioned have obvious disadvantages. Investigators report[3] however, that at 60° F. eighty parts of tetralin will readily absorb twenty parts of naphthalene. Experiences both in this country and in Europe indicate that tetralin has a vapor pressure range that insures a fog sufficiently permanent to provide effect for long distances, and condenses in an amount ample to absorb accumulated deposits. It is insoluble in water, and when used in the proper quantities[4, 6] no apparent change in heating value of the gas is evident. When the naphthalene content of the gas to be treated is known, it is possible to accurately calculate the amount of solvent required. After an initial cleaning treatment has been completed, the following simplified formula[4, 6, 10] will indicate the quantity required for regular use:

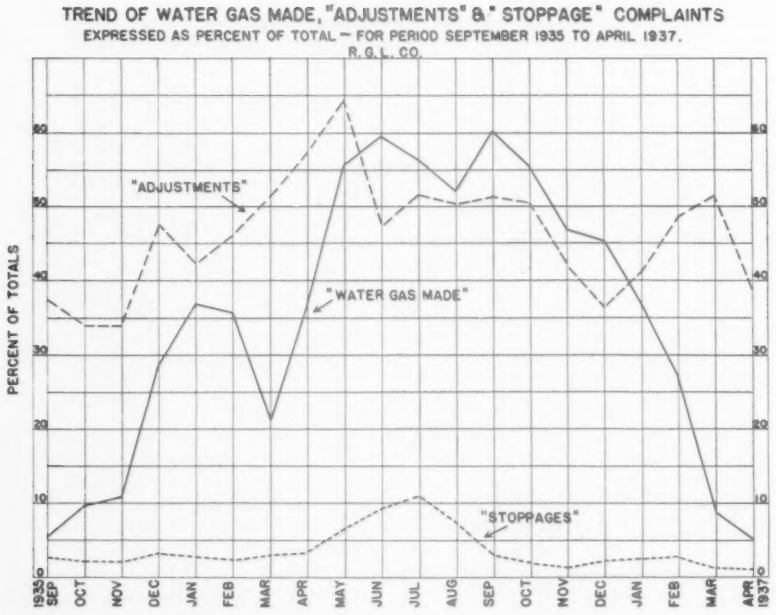
$$X = 4.26\ (A\text{-}2)$$

Where: X = the pounds of tetralin required per million cubic feet of gas.
A = the naphthalene content of the gas in grains per hundred cubic feet.

Vapor tentions curves of naphthalene, tetralin and the compound of both, have been prepared[13] by the use of which the amount of naphthalene condensing through a given temperature drop is designated and the exact amount of the solvent required for complete absorption can be determined. European companies using tetralin at prices comparable to those prevalent in the United States claim that when it is employed for the elimination of naphthalene in the gas produced, or for dissolving old stoppages, the cost will vary from .07 to .14 cents per M. C. F. treated. The higher figure is the cost of cleaning old systems and the lower amount usually represents the expense accompanying continued use. Being cognizant of the requirements outlined above, that are fulfilled by tetralin, and governed to some extent by the experience of associate companies, this product was used by our company to combat an unusual situation of naphthalene deposits.

Under typical operating conditions, this plant produces annually a mixed gas consisting of approximately 90% coal gas and 10% water gas. Coal gas is made in three benches of continuous vertical retorts, and as a result of the relatively low temperature of carbonization, no naphthalene is produced. Water gas is made semi-weekly during three or four months of the year and never at any time exceeds 20% of a daily sendout. The mixed gas distributed under these circumstances gave no difficulty in the form of deposits or stoppages.

* *Presented at the Distribution Conference American Gas Association, Cincinnati, Ohio, April 4-6, 1938.*

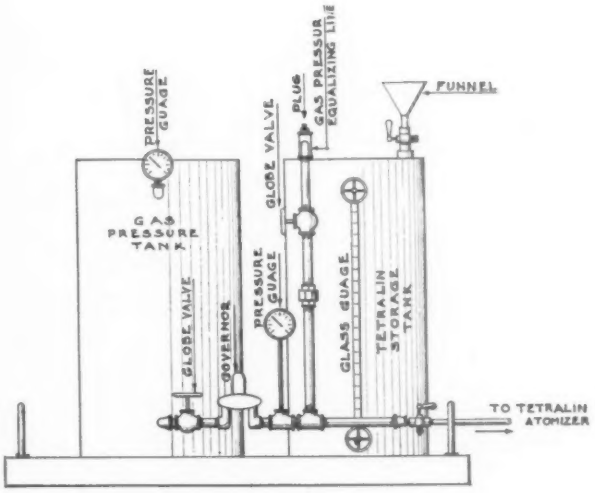

TREND OF WATER GAS MADE, "ADJUSTMENTS" & "STOPPAGE" COMPLAINTS
EXPRESSED AS PERCENT OF TOTAL — FOR PERIOD SEPTEMBER 1935 TO APRIL 1937.
R.G.L. CO.
PERCENT OF TOTALS
"ADJUSTMENTS"
"WATER GAS MADE"
"STOPPAGES"
1935 SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR 1937

It became necessary early in 1936 to undertake a bench refilling program, which would reduce the coal gas-production capacity by 33% for a period of eighteen months. This deficiency could be produced by the stand-by water gas plant, operation ten hours a day, six days a week. The water gas set is of recent design, and has a capacity of approximately 65 M. C. F. per hour. The condensing and scrubbing equipment is over twenty years old, and was intended for a capacity of approximately 30 M. C. F. per hour. Under the conditions described as typical, it was possible to operate this machine at full capacity, and pump gas through the purifying equipment at the rating for which it was installed. In order to keep the mixed gas gravities within prescribed limits a density recorder is used to control the rate of mixing. With one bench out of service, the plant could have been operated normally, making about half a million cubic feet of water gas per day, with intermittent operation of the set, and observing the limitations of the scrubbing and condensing apparatus by regulated pumping.

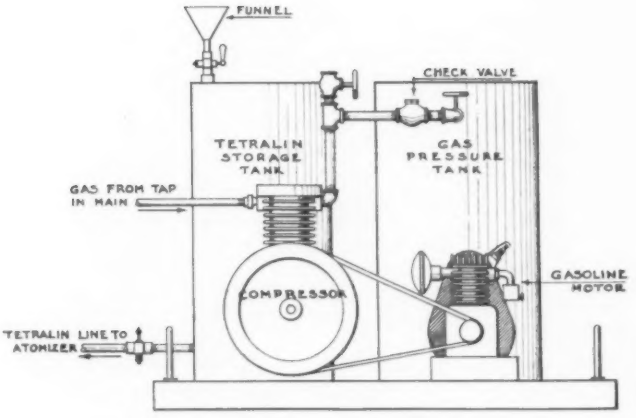
Shortly after reconstruction was begun on one bench, one of the other two in service developed a recuperator leak, which became progressively worse. Within a month, it was necessary to operate this bench at about one-third of its rated capacity, which consequently required the production of water gas far beyond the estimate. It therefore became necessary to produce 70% of the daily sendout as water gas, instead of from 30% to 35% as originally forecast. In the first few weeks of such operation, many complaints were received for "adjustments," occasioned by the change in mixed gas gravity. The pressures on the distribution system were raised to compensate for the increased density of the gas distributed, and the records show that the average mixed gas gravity changed from .45 to .54 within thirty days.

The adjoining graph indicates the trend of water gas in the mixed gas, and the complaints received as a consequence of the change in gas characteristics, during the entire period of bench work. As it was necessary to produce water gas at a rate greater than the capacity of the scrubbing and condensing equipment, considerable naphthalene was carried into the distribution system. Picric acid tests indicated that at times the mixed gas contained between ten and twelve grains of naphthalene per hundred cubic feet. Under ordinary conditions, this would not have been considered an abnormal amount, but if allowed to continue without correction would have resulted in an unusual number of complaints, particularly during cold weather. Obviously, it was necessary to take immediate steps to prevent utilization difficulties, brought about by the deposits which would continue and probably increase, throughout the period of bench rehabilitation. It was not possible to add adequate scrubbing and condensing equipment in time to be effective and corrective measures had to be undertaken promptly. "Stoppages" had increased in certain areas very rapidly, and many repeat complaint calls of this nature were necessary. It is to be noted on the graph that the trend of complaints due to naphthalene deposits very evidently lagged behind the change in mixed gas, which should be considered entirely normal. Tetralin was obtained as being apparently the quickest corrective measure, and before it was used every effort was made to ascertain the most effective means of application. It appeared that to introduce this solvent in the gas at the plant would not bring about the immediate effect required, as the complaints were restricted to areas of small mains, and localities where the mains were close to the ground surface. These sections in every instance were quite remote from the plant. Further, it is contended by authorities[2, 6] that it is not possible to bring about rapid correction of such situations, by the introduction of tetralin at the plant, and this procedure has even been known to temporarily aggravate conditions. It is claimed that large quantities of the naphthalene produced are kept in solution by oils and tars and deposited in or near the plant. When tetralin is first introduced at the plant, it dissolves these deposits, carrying the oil and tar into the drips, the naphthalene migrating into other parts of the system, where in cooler mains it deposits in crystalline form. In view of these conditions, it appeared that the most satisfactory results could be obtained by the application of tetralin in the localities where the trouble was being experienced. Reference is made to the use and adaptability of portable apparatus in several articles[3, 4] but little definite information is given. In fact, the design of the apparatus used for either vaporization or atomization, as given in the literature[1, 6] of European applications, is such as to make portability impractical and appears to be unnecessarily complicated. Several forms of equipment, similar to the one to be described were used before any real element of success was obtained. The portable equipment finally developed, shown in the drawings was located on the mains feeding gas into the areas of difficulty, and tetralin fogged during the time of peak demand. As these periods of demand vary in different sections, it was possible to fog several localities in one day.

Referring to the accompanying drawings, the portable apparatus consists of a three-quarter horsepower 2½"x2½" Quincy compressor, driven with a V-belt by a three-quarter horsepower, single cylinder, Lauson gasoline engine. The engine



ELEVATION VALVE SIDE

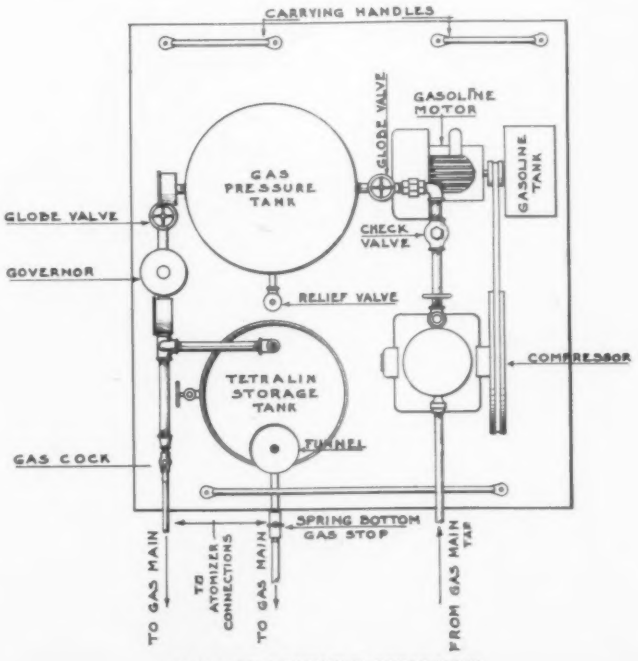


ELEVATION COMPRESSOR SIDE

is air cooled and will operate over four hours on a quart of gasoline. The gas pressure tank is of welded construction, tested to a pressure of fifty pounds per square inch and equipped with a relief valve, set at thirty-five pounds. The tetralin storage tank has riveted and soldered seams and a capacity of ten gallons. The gauge glass of the tetralin tank is calibrated in one-inch divisions, each inch representing one-half gallon. By this means the rate of liquid flow is observed and any stoppage in the atomizer would be easily detected. The gas pressure equalizing line is used when it is necessary to force the tetralin flow, when treating high pressure mains. Tubing is used because of its flexibility and five-eighths and one-quarter inch sizes were necessary as shown. To insure the atomizer being in the center of the gas flow, a separate design is required for each size of main. An atomizer for a four-inch main can be inserted through a one-inch tap, and for a six-inch main through a one and one-quarter inch tap. The nozzles, soldered into the tubing of the atomizer, are blank by-pass orifices for an oven heat regulator, drilled to a No. 60 opening. All pipe joints are made with litharge and glycerin, and other connections are soldered or S. A. E. fittings.

The cost of constructing the apparatus, including all material and labor, approximated $150.00. As an indication of its portability, the equipment will fit into the smallest truck bed, and weighing only two hundred eighty pounds can easily be handled by two men. The simplicity of design is such that the usual street department employee can operate it satisfactorily and little supervision is required.

In operation, two taps are made in the main as shown on drawing No. 4. Gas is drawn from the main and compressed into the gas tank, the pressure maintained at approximately twenty pounds with the compressor running at 200 R.P.M., or half its rated speed. Gas going to the atomizer is regulated to a constant five pounds by the specially designed governor. The tetralin flow can be accurately controlled by the spring bottom gas stop. Two notches are cut on the body of the stop to correspond with two positions on the core, for maximum and minimum rates of flow. The particular rate of flow selected was determined by the effectiveness of the atomizer. The best conditions of fogging were obtained with a rate of from one-half gallon to a gallon of tetralin per hour. At approximately three-quarters of a gallon an hour, the amount of tetralin going through the lower nozzle is hardly discernible. Yet when this quantity it atomized by the gas flowing from the upper nozzle, a fog is produced that will travel the distance of a sixteen-foot length of four-inch pipe and issue out the end in a vapor that can be photographed. When more than one gallon per hour is used, all of the solvent will not be atomized and the excess drips from the nozzle. It was not possible to calculate the gallons of solvent used per million cubic



PLAN OF PORTABLE APPARATUS

feet of gas, or to use any other customary index, because the gas flow was not known. The systematic use of tetralin was begun in July, 1936, and the areas of known difficulty and shallow mains were treated regularly at intervals of one week for about three months. After that time, they were treated once a month. With such a schedule, it was possible to bring the number of "stoppages" back to a normal figure within a short time, as indicated on the graph. The equipment was also used on the principal city mains leaving the plant, during the intervals between section treatment.

While the complaints attributable to naphthalene stoppages represented a small portion of the total, referring to the graph it is to be noted that the maximum number of "stoppages" for one month represents an increase of 300% over the previous average. Those companies experienced with naphthalene deposits recognize that the situation would have become far more aggravated since the conditions become rapidly cumulative. As an indication of the extensive distribution difficulties caused by such deposits, it is reported[12] that ten grains of crystalline naphthalene will completely choke a half-inch pipe for a distance of a foot. Coal gas at 40° F. is saturated when it contains as little as three grains per 100 cubic feet. Recognizing these factors, it is safe to conclude that had no corrective measure been undertaken, the "stoppage" complaints would have increased at such a rate as to become a serious problem in the winter months of 1936-37.

As the effectiveness of the treatment became apparent, an effort was made to determine how generally adaptable the process would be. A modification of the method proposed by Robinson[11] was used to determine how far the fogged solvent would travel. Filter papers inserted in tar cameras installed on riser pipes and services, showed by odor that the solvent travelled from a minimum of three typical city blocks to a maximum of seventeen blocks. Such determinations were made by detecting the odor of tetralin on filter papers exposed to a normal gas flow, during and after the periods of introduction. As tetralin has an unmistakably characteristic odor, it was possible to conclude with an element of accuracy, the presence or absence of the solvent by the method described. The factors having the greatest effect on the distance of travel were, naturally, the size of the main and the rate of gas flow.

It is estimated that the amount of main treated with the portable apparatus totalled nearly twenty miles. While it is obviously not possible to calculate the cost of treatment on a basis of M. C. F. it is equally inaccurate to arrive at the expense incurred on a basis of cost per mile, as in most instances the mains received what can be considered an excess of the solvent. However, practically no tetralin, as such, was recovered from the drips.

Since this experience, a stationary installation of essentially the same design, using the same type of atomizer and utilizing the gas from the high pressure storage tanks, has been permanently located in the gas plant. Tetralin is introduced in the mixed gas entering the holders on the days when water gas is made. A typical month's operation indicates a cost of such a method of treatment at .03 cents per M. C. F. of mixed gas made.

It is our opinion that no less expensive and more effective method of correcting the situation could have been pursued, and that both the process and the product have a general application in the industry.

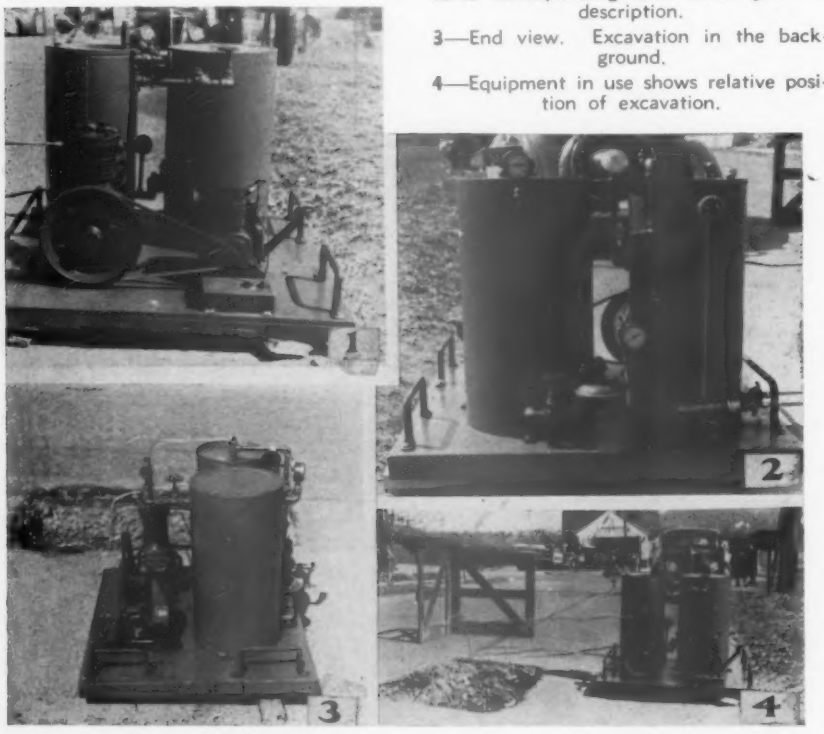
(Concluded on page 53)

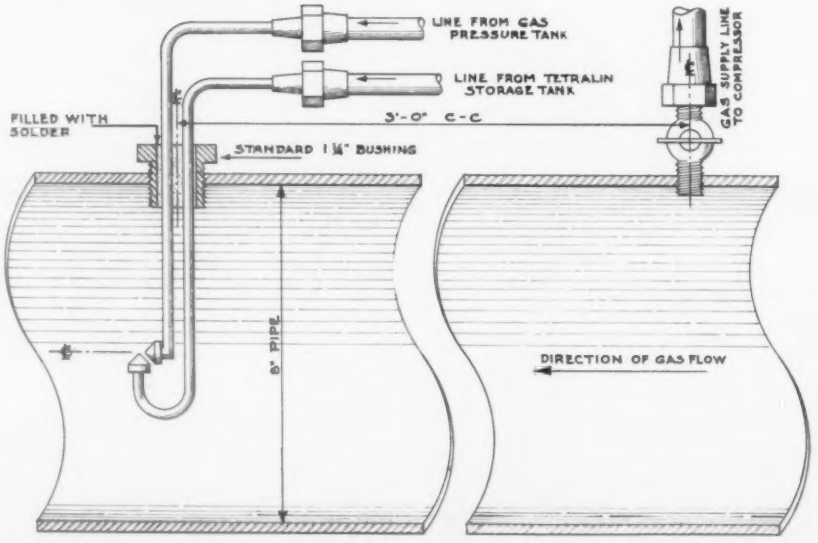
1—Apparatus from Compressor side, taken while in actual operation.

2—View from Valve side. Note the pressures corresponding with those given in description.

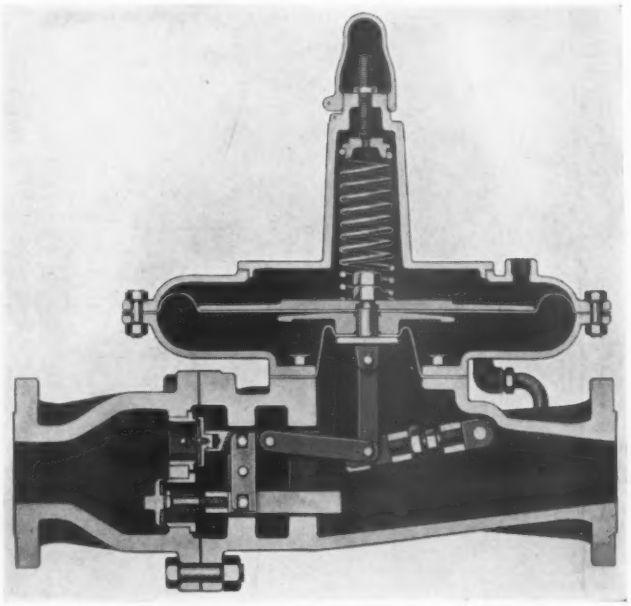
3—End view. Excavation in the background.

4—Equipment in use shows relative position of excavation.





Industrial GAS CONTROL



Cross-Section — Reynolds Spring Type, Double Valve, Toggle Type, Flanged Regulator for Industrial Use

REYNOLDS Toggle Type Regulators for industrial gas control offer these features:

Removable Valve Pocket and Orifices—side hand holes—streamlining that does not change direction of the flow of gas, increasing capacity and range—*pressure reduction from pounds to pounds and pounds to inches W. C.—single or double valve construction—spring or dead weight type adjustment and equipped with or without pilot control.

Regardless of how unusual or difficult the requirements, there is a REYNOLDS engineer ready to give you the correct answer. Many manufacturers who desire greater safety and accuracy on their products regularly consult with our Engineering Department. The same service is yours for the asking—write.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing or a pounds to inches W. C., diaphragm casing may be used or interchanged.

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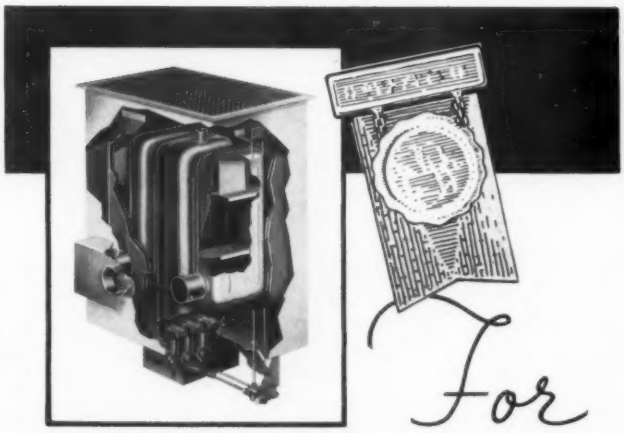

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Some one ought to hang a medal on the Payne Floor Furnace. It would be hard to find a heating unit in the entire country that has done as much to sell GAS —and the idea of GAS heating.

The Payne Floor Furnace operates with such thrift that it is used more often—stays lighted longer. It builds the kind of a load you want.

It is so dependable in operation and heats so satisfactorily that it starts people talking about the advantages of GAS heat in general—and, of course, Payneheat in particular.

Each month sees amazing strides in the popularity of the Payne Floor Furnace. And why not? It is generally recognized as the most economical and efficient floor furnace ever built!

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FURNACE & SUPPLY CO., INC.
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Above: Battery of 6 Magic Chef Heavy Duty Gas Ranges with Ovens, 2 Heavy Duty Broilers, and 2 sections of Double Roasting Ovens, installed in the Mt. Sinai Hospital Kitchen.

Right: Mt. Sinai Hospital Building, Fifth Ave. at 100th St., New York City. Established 1852. Affiliated with Columbia University since 1923. Value of grounds, building and equipment in excess of $12,000,000.00.

—so Mt. Sinai chose Magic Chef

MAGIC CHEF AUTOMATIC HEAVY DUTY EQUIPMENT

Exclusive Features

Red Wheel Lorain Oven Regulator
Magic Chef Top Heat Control
Uniform Heat Top — Insulated Cooking Top
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Magic Chef Non-Clog Burners

•

Gas Economy — Greater Speed
Easiest to Clean — Simplest to Operate
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COMPLETE AND FLEXIBLE LINE OF
RANGES, ROASTERS, BROILERS, BAKERS

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● For nearly a century Mt. Sinai has stood for the finest in hospital service. Its uncompromising high standards have earned for it a position of national prominence . . . More exacting demands than those asked by this hospital of its new cooking equipment have seldom, if ever, been made . . . The Magic Chef Heavy Duty Gas installation shown above satisfactorily meets these requirements . . . Magic Chef also has the best answer for your kitchen cooking problem—whatever your demands may be. Phone or write your nearest branch.

USE GAS—THE IDEAL FLEXIBLE FUEL

Magic Chef
AMERICAN STOVE COMPANY

Servicing Domestic Appliances

Part I

By
E. W. Christell
Junior Engineer
The Peoples Gas Light and Coke Company
Chicago, Illinois

Introduction

The servicing of domestic appliances of today requires the services of men who are being trained continuously in the operation and adjustment of the modern full automatic gas appliances. Training in Appliance Servicing cannot be obtained in High Schools or Colleges either before or after working hours, consequently, the appliance serviceman is entirely dependent upon the training given him by the utility, dealer, or manufacturer during classroom or field instruction. This training material is usually based on the information obtained from the manufacturers' representatives, on tests conducted by the utility, on the common complaints received on the appliances, and on the practical experiences acquired by the servicing organization while answering complaints in the field. The serviceman also depends on service manuals, cross sectional drawings, and other forms of literature supplied by the American Gas Association, utility, or manufacturer for home study and reference purposes, and on the experience which he acquires while servicing the various appliances in the field.****

Necessary Fundamental Training

In order to obtain an efficient and powerful service organization, which is capable of correcting any type of service request, it is believed that the serviceman should be trained and provided with the following fundamental information:

1. He should be trained in the construction, operation, and the adjustment of all the component parts and controls on the common appliances found on the utilities lines. With this training he should be able to efficiently execute all the work necessary to place or restore the customer's appliance to its proper operation on the initial installation or the first service call. It is also essential that the training course be prepared so as to provide the serviceman with all the known short cut methods in tracing service trouble on appliances. With this instruction he should be thoroughly qualified to render service in as short a period of time as possible and with the least amount of inconvenience to the customer.

2. He should be trained so that he is able to courteously provide the customer with a thorough and accurate explanation of the operation, the lighting and the care of their appliance.

3. He should be trained in public contact work. This training is essential when it is realized that the serviceman spends all of his time on the customer's premises, where it is necessary that he (as a representative of the Company) maintain the good will of the customer as well as the customer's confidence in the appliance. This training is fundamental to our servicemen and it is felt that more time and effort should be devoted to customer contact work in the future. This is especially necessary at this time in view of the competition which we are now being confronted with. The servicemen must fully understand how to approach the customer so as to make an agreeable first impression and also how to conduct themselves on the customer's premises at all times. In order to do this he must be thoroughly sold on his own company, he must be thoroughly sold on the importance of maintaining customer satisfaction in their appliances under all conditions, and he must be thoroughly sold on the idea that every gas appliance on the customers' premises is of a satisfactory design regardless of his personal opinion. It should be realized that the customer can easily be antagonized when their gas appliance has given them trouble, due to comments made carelessly by the servicemen.

4. It is also believed that the appliance servicemen should be trained to some extent in salesmanship, solely with the thought in mind that this training will enable them to take advantage of every opportunity to intelligently discuss with the customer the new features offered on the modern present day appliances. It is well that we realize that our servicemen can do considerable good in work of this kind to pave the way for future gas appliance sales. This training would enable the servicemen to increase their earning power through increased commissions from prospects, and it is felt that it will also provide greater interest in their work.

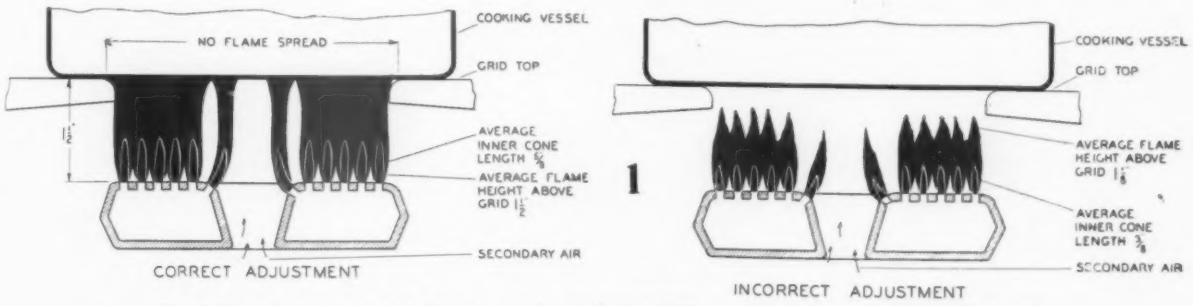


Fig. 1 Comparison of a typical old style regular top burner with correct and incorrect flame adjustments.

Modern Gas Range

The proper servicing of the modern gas range is probably one of the most important problems confronting every utility today. In view of this, it was felt desirable to select the gas range as the subject of this paper.

Prior to the introduction of the modern fully automatic gas range, servicing of the old style range was very simple. The valves, orifices, burner air shutters, top lighters, oven heat controls and other parts requiring service were all exposed and very accessible for service. The appear-

From paper presented at Fifteenth Annual Distribution Conference American Gas Association, Cincinnati, Ohio, April 4, 5, and 6, 1938.

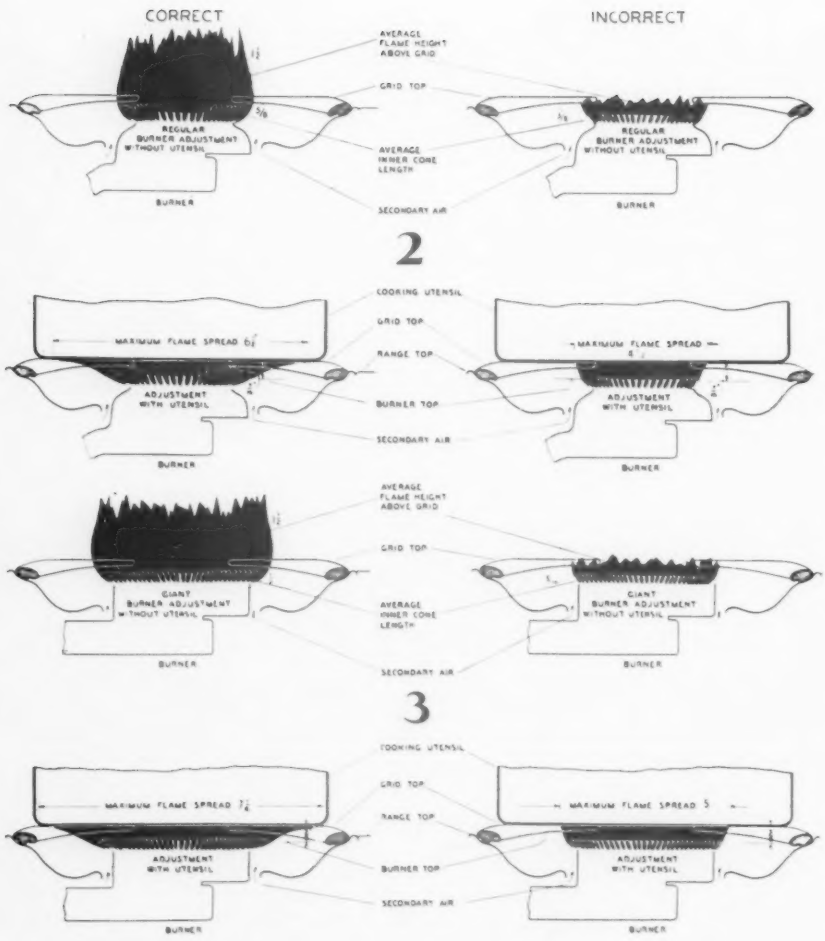


Fig. 2 Comparison of a typical modern range regular top burner with correct and incorrect flame adjustments.

Fig. 3 Comparison of a typical modern range regular top burner with correct and incorrect flame adjustments.

ance of the range itself suggested simplicity. While there may have been hundreds of different manufacturers' ranges in service, the top burners and oven burners were all practically identical in design and the adjustments were practically all the same. These adjustments consisted of simple gas orifice and air shutter adjustments or the cleaning of the top burners. Naturally, simple adjustments of this type did not require continuous and extensive training, since the burner designs were rarely changed and the basic training received on gas ranges by the service organization was adequate for many years. Now, with the advent of new modern gas ranges of all types every year, with all of their new features and changes in burner design and adjustments, a need for continuous training of the appliance service organization becomes very evident.

The Modern Automatic Gas Range has every feature that has been perfected for the modern methods of cookery; automatic lighting top burners and oven burners, precision oven heat control with thermal eye or equivalent, improved oven insulation to assure better heat distribution and prevent heat from entering kitchen immediately, new low temperature oven burners to assure the maintenance of low oven temperature, new round horizontal flame top burners with individual simmers to enable customers to use the waterless method of cookery, and many other improvements too numerous to mention.

All of the aforementioned improvements in design on the modern gas range have resulted in higher operating efficiencies at less cost to the customer, yet these improvements are not worth the paper they are planned on, if the proper adjustments are not made by the servicemen to provide the operation they were designed for. The proper adjustment of the gas range and the maintenance of this appliance's efficiency rests entirely in the hands of the service departments of both the utility and the dealer. If improper adjustments are made by either one, the range efficiency is lowered and dissatisfaction in the operation of the range is expressed by the customer.****

Most customers naturally compare the operation of any newly purchased gas range to that of their old range. Have you ever heard a customer use this expression, "My new range does not cook as good or as fast as my old range," or "You can't beat my old range for baking," etc. In general, it is believed that one of the reasons for the customer's ever making this comparison is due to the fact that their ranges have been improperly adjusted by servicemen who have not been properly trained in the correct burner adjustments and who are unfamiliar with many of the new ranges being brought out in the field. Consequently, the gas range is not providing the customer with the service that she was informed she would obtain.

Complaints of this kind have been reported by many companies after the introduction of the modern automatic gas range. Their investigation of this situation has revealed many startling findings, which were at first hard to believe. Many discovered that some of their own servicemen, as well as dealers and factory representatives, were adjusting the new style range top burner flames by eyesight as in the past, but were continuing to adjust the flame heights on the new horizontal flame top burners so that they would not exceed the top of the burner grid. Oven and broiler burner flames were also found being adjusted to about the same flame size as they formerly were on the old style oven burners. These adjustments resulted in the reduction of the gas rate to both the top burners as well as the oven and broiler burners by as much as 25 to 40% of their rated hourly B.t.u. input. Several have also found that ranges connected on the sales floor of dealers and even on their own companies' sales floor were improperly adjusted, many of which had been serviced by the manufacturers' representatives. This condition naturally was extremely undesirable, since a good many of the modern gas ranges are sold on the sales floor where the customer observes the operation of the range and burners very critically. Several companies have reported that in many cases it was found necessary for the serviceman or in-

staller to resell the customer on the proper burner adjustment, after they had once seen the improper adjustment on a sales floor.

Other departments, such as the Sales, the Home Service and High Bill Investigating Departments have also been reported as being unfamiliar with the correct burner adjustments on the modern gas range. It is believed that all public contact departments should be trained in the correct burner adjustments on all modern gas appliances.

Training Procedure

In order to correct this misunderstanding, by many of the servicemen as to the correct burner adjustments on the present day gas ranges, immediate instructions had to be given to all concerned by many of these Companies and Dealers. These courses of instruction varied considerably; however, it was generally felt advisable to thoroughly inform the men on the fundamentals behind the changes in the modern range design. A suggested outline of the improvements made on the ranges which it is believed should be discussed, preparatory to the discussion of the adjustments, is as follows:

1. Reduction of secondary air to the oven and its effect on the gas required to maintain oven temperature settings.
2. Insulation and the important part it plays on fuel consumption, time required to preheat oven, and on oven surface temperatures and room temperatures.
3. New low temperature oven burners, and the advantages gained by their design.
4. Improvements in broiling resulting from use of smaller oven or separate broiler burners.
5. Construction of new and old top burners and the advantages of the new burners.
6. Secondary air control to top burners as governed by the aeration bowl and center opening in top burner.
7. Effect of top burner grates on efficiency.
8. Effect of burner replacement in relation to the burner grates.

Upon completing a discussion on the changes in the range design, it is believed that the men will have obtained a background which will enable them to understand the new adjustments required on the modern range more readily. The course on the adjustments should include instruction on the following burners, devices and controls:

1. Procedure for adjusting the old style star shaped top burners, along with an explanation of the incorrect adjustments.
2. Procedure for adjusting the new style round horizontal flame burners and the reasons for these adjustments.

Incorrectly adjusted burners should also be discussed and thoroughly reviewed with the students.

3. Simmer burner adjustment.
4. Low temperature oven burners and the changes in the type of adjustments required.
5. Oven heat controls.
6. Automatic top lighters.
7. Automatic oven time control clock.
8. Automatic safety pilots for ovens.
9. Burner cocks.
10. Common troubles and complaints on range.
11. Baking failures and their remedies.

A course of instruction on the modern gas range should be accompanied by as many demonstrations as can be made on the different types of ranges which the utility merchandises. It would be most desirable to have a range from the line of each manufacturer, so the various types of burners and adjustments can be demonstrated to the students. An old style range should also be included amongst the ranges to be discussed.

It has been the practice of several companies to first give the training program to the supervisors and inspectors so that their reaction could be obtained before the course was given to the servicemen. In some cases, it has been the practice to ascertain the type of adjustment each student considers to be correct, prior to giving the course of instruction, by adjusting several of the horizontal flame burners on the ranges incorrectly. This has been accomplished by adjusting some of the burner flames so that they were even with the burner grates and others to the correct B.t.u. input. When correctly adjusted, the total flames extended to about 1" to 2" above the burner grates. In many cases the flames adjusted even with the grate have been considered correctly adjusted by the

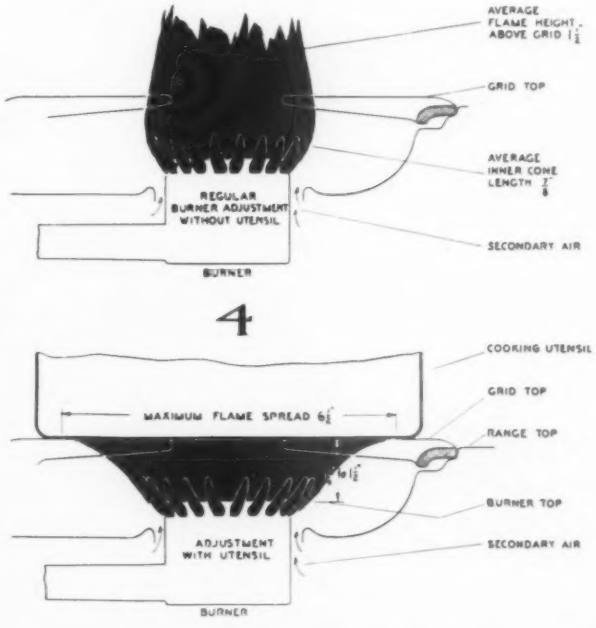


Fig. 4 Typical modern range top burner with correct flame adjustment.

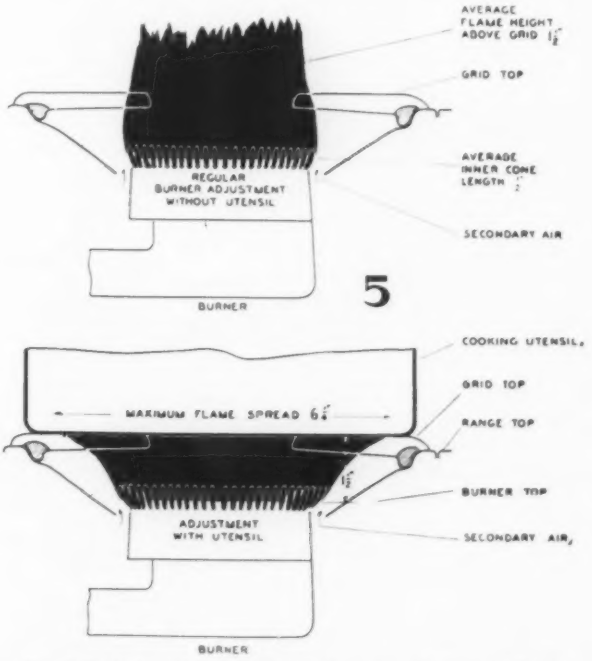
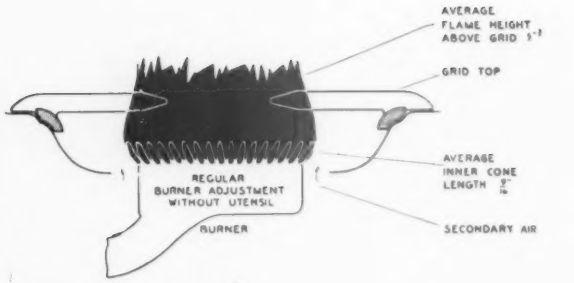


Fig. 5 Typical modern range top burner with correct flame adjustment.



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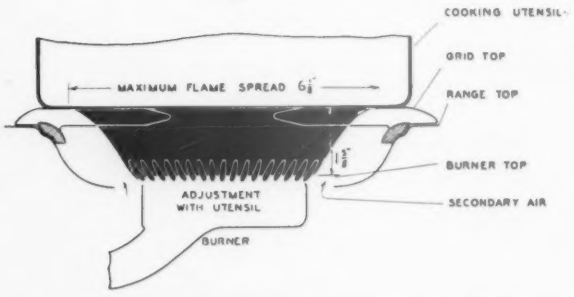

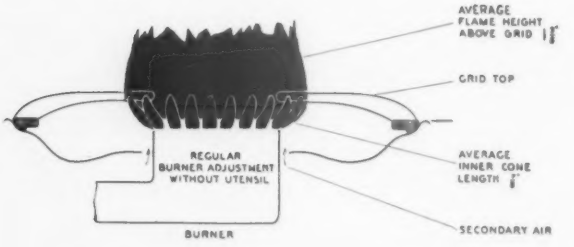

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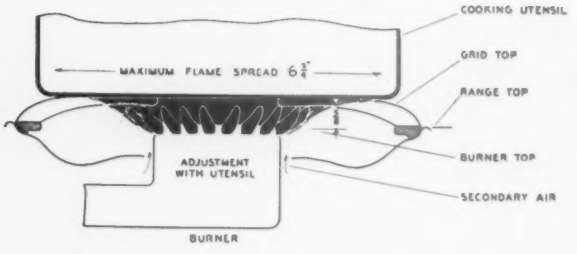
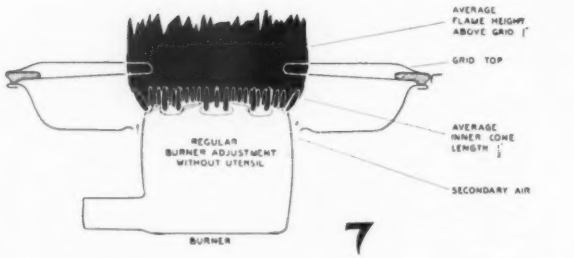


Fig. 6 Typical modern range top burner with correct flame adjustment.

Fig. 7 Typical modern range top burner with correct flame adjustment.



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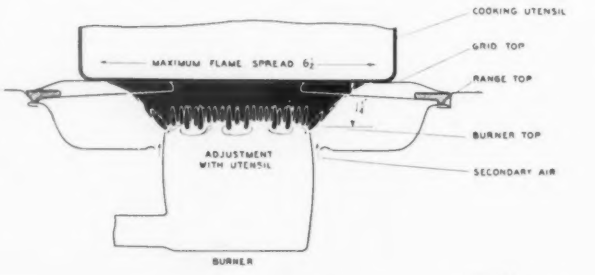

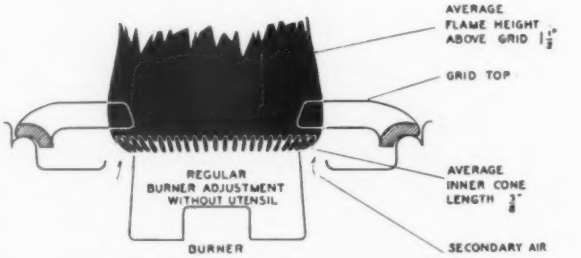

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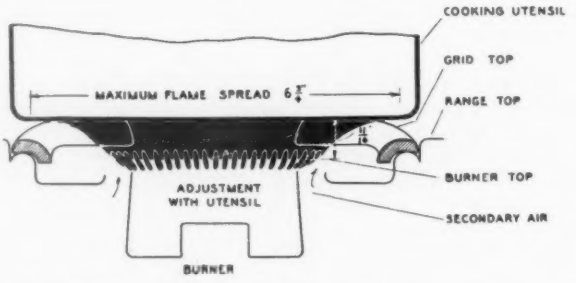

Fig. 8 Typical modern range top burner with correct flame adjustment.

Fig. 9 Typical modern range top burner with correct flame adjustment.

servicemen but also of the manufacturers' representatives and servicemen. Comments received from a number of companies have indicated that upon completion of a course of instruction on the modern range adjustments it was very apparent that everyone had been completely overtaken by the change in burner adjustments.

This can possibly best be explained by reviewing part of the course pertaining to the top burner and oven burner adjustments, which was given by our Company at the time the modern range was first introduced. In discussing the top burner adjustments on the new ranges a comparison was first made by demonstrating the correct and the incorrectly adjusted flames on the old star shaped burners as illustrated in figure 1. These adjustments were then compared with the adjustments for the modern horizontal port top burners.

Modern Range Top Burner Adjustments

When the new burners were first introduced it was not the easiest problem to sell appliance servicemen, who had adjusted the top burner flames even with the top grates for years, on the new adjustments. Some of the older servicemen seemed to feel that by permitting the flames to extend above the burner grates they were going against all former rules and regulations. In order to be assured that the servicemen would thoroughly understand the new adjustments, it was found desirable to use a Pyrex glass dish so the gas flames could be observed more readily from the surface. The Pyrex glass dishes have not only been used during the

training school, but have also been used in the field to demonstrate the correct burner adjustments to the customer. This demonstration has often been found necessary, where new ranges are installed, inasmuch as the customer has always been instructed in the past that the overall flames should not exceed the top of the burner grids. The Pyrex dish has clearly demonstrated to the servicemen and to the customer the flame spread which takes place when a cooking vessel is placed over the burner. Figures 2 to 9, will in each case illustrate the flames extending above the grates without a cooking vessel placed over the grate and also the flame spread when a cooking vessel is placed on the grate.

With the change in burner adjustments comes the thought of establishing a simple method of adjusting these burners to the correct input. It has been found impractical to determine the correct adjustment by measurement of the inner cone flames or the total flame as these measurements were found to vary on different types of burners. In very few cases has the distance from the top burner ports to the top of the burner grates been found the same or the number and size of the burner ports. It is felt that the difficulties which would be experienced by using inner cone or total flame measurements as a means of determining a correctly adjusted burner can be readily seen in figures 2 to 9.

The drawings figures 2 to 9 illustrate the flame spread of the burners when they are adjusted to their maximum safe input which in most cases is above the minimum rating of 9000 Btu per hour. It has been found desirable, therefore, to use a 6" flame spread on regular top burners and a 7¼" flame spread on Giant top burners as a means of determining a satisfactory top burner adjustment. In either case, if the gas and air adjustment is made to these measurements, the minimum rating of the top burners has always been obtained. This flame spread should be determined with a cooking vessel placed over the burner.

It has been found that on the horizontal port type of burner, floating flame conditions do not occur as easily as on the old star shaped burners, even though the burners might be overgassed.

Simmer Burner Adjustments

The simmer burner is provided for the purpose of maintaining boiling temperature, consequently it is also important that as much attention be paid to the simmer adjustment as the regular or giant burner adjustment. If this burner is adjusted properly it will maintain any amount of water up to six quarts at boiling temperature provided the vessel is covered and there is just enough heat applied to the cooking vessel.

The simmer flame adjustment should not exceed the top of the burner grid. However this adjustment is also governed by the ignition of the flames on the simmer burner from the insta-flame lighter. The simmer section of the burner must provide immediate ignition from the pilot.

Sellman Appointed Chairman A.G.A. Laboratory Committee

N. T. Sellman, assistant vice-president, Consolidated Edison Company of New York, has been appointed Chairman of the Managing Committee of the American Gas Association Testing Laboratories, to succeed the late John S. DeHart, of Newark, N. J., president of the Isbell-Porter Company.

An Economic Necessity

"COOPERATION is not a sentiment—it is an economic necessity," said the wizard, Charles Steinmetz. A true saying! And to realize it, G. P. M. keeps on hand the largest ready-to-use stock of prepared oxide in the world (more than 600,000 bushels) so that the simultaneous emergency calls of several gas plants may be instantly satisfied.

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You can see how the Hays' Double Seal Copper pipe connection, with its 2 machined seats (45° plus 90°) grip and hold the 2 faced flanges (45° plus 90°) of the pipe to make a positive doubly tight air, gas or liquid seal. The new folder describes how Double Seals fit into your needs to save money and time. Shows how to make permanent trouble-free main to meter copper pipe connections—Gives results of a survey on use of copper service pipe—diagrams the Hays Copper Plumbing Method. Write for copies.

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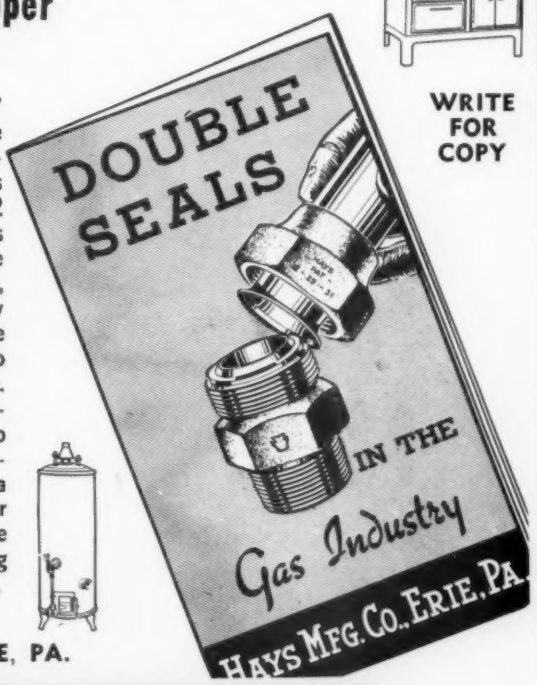


HAYS MFG. CO., ERIE, PA.

Specify HAYS DOUBLE SEALS

ANNOUNCEMENT

The next Edition of AMERICAN GAS CATALOG AND HANDBOOK will be issued the latter part of May.

Certain valuable data material which we wanted to include in the issue was not available until recently. We believed it to be of sufficient importance to postpone the issue until it could be included.

This volume of data material is compiled and issued as an auxiliary service to subscribers to AMERICAN GAS JOURNAL. Every subscriber gets a copy automatically when issued. Watch for your copy.

AMERICAN GAS JOURNAL

53 Park Place New York

Make Your Sales Talk Fit the Prospect

And Sew Up The Sale

By
Arthur Roberts

"I have worked for gas companies who had sales directors who sent out the men with literature and 'Good Luck,' where a few pointers on the type of prospects most frequently encountered in selling gas appliances and how to handle them most effectively, would have helped much in getting more business."

THE salesman who classifies prospects according to their characteristic reactions to specific sales treatment has an advantage over the salesman who passes out the same sales hash to all.

This analysis offers methods for getting maximum results with the 5 different types of prospects most frequently encountered selling gas appliances for gas companies.

1—The agreeable prospect. Says "yes" to everything you say. Very courteous, but strangely enough, the hardest to sell. Because she doesn't contradict and listens respectfully, that doesn't mean that she agrees with you. Many salesmen break their hearts with this type prospect because they think the sale is in the book, only to leave without it. Because of natural politeness or a tendency to agree with other people, the agreeable prospect often will not state her real objections. So it is hard to tell what is in her mind. She will "yes" you until you think the sale is in the kit, then hedge, and in almost every case, switch to personal reminiscence, entirely ignoring the salesman's proposition. Don't haul this prospect up short. It will disconcert her so much that the sale will go ga-ga right there. Angle for the sale as for trout, watching for opportunities to cast appeals here and there into her irrelevant stream of chatter and reel her in with a strong line. This is the most effective way to deal with her. In talking about herself, her connections and friends, this prospect often discloses facts that show a real need for your merchandise, or that can be jockeyed into a position beneficial to your proposition. Frequently, this prospect, if you let her talk long enough, gives valuable leads of this kind, information that would not be forthcoming if the salesman tried to keep her strictly to his proposition.

2—The "Know-It-All." You can't tell HER anything about anything. She knows everything about everything. Almost always wrong in her opinions, but never knows it. The surest way to antagonize her is to show her she is wrong. With this prospect, the salesman should be the "Yes Man." Try to sell her on your proposition through appeals, which, in no way, conflict with her pet ideas. Vanity, being her dominant trait, the best way to sell the "Know-It-All" is to play up to her. She delights in airing her knowledge and opinions. Let her have the rostrum. While she is talking, she is feeding her vanity and making the going easier for the salesman.

One requisite of good salesmanship is to have the faculty for making prospects talk. The idea is erroneous that salesmen should do all the talking. Salesmen who do all the talking, never know what their prospects are thinking about, and what selling appeals will click best with them. A salesman can talk himself out of a sale as well as into one. The "Know-It-All" likes an appreciative audience, likes her views endorsed. By fanning this egotism, you establish cordial relations, then it is comparatively easy to sell her. Obviously, two great and sympathetic minds could not be far apart on any proposition, could they?

Many strong-minded salesmen, running true to form, try to force their opinions on the "Know-It-All," even when those opinions do not necessarily affect the sale. They usually lose out, regardless of how much juice they put on the ball. Let the "Know-It-All" have her way on non-essentials. Stand ground on the essential features of your proposition.

Five Types of Prospects—Look 'em over

The "Yes" prospect:—Courteous but hard to sell. Let her talk—she'll give you a lead.

The "Know it All":—With such the salesman should become the "Yes Man." It flatters her.

The "Sour-Puss":—An attitude adopted as defense against purchase. Be friendly.

The "Sphinx":—Mentally alert but says nothing. Hard to fathom. Use diplomacy.

"Calamity Jane":—Always "Can't afford it." Often wants to buy cheap. Talk quality.

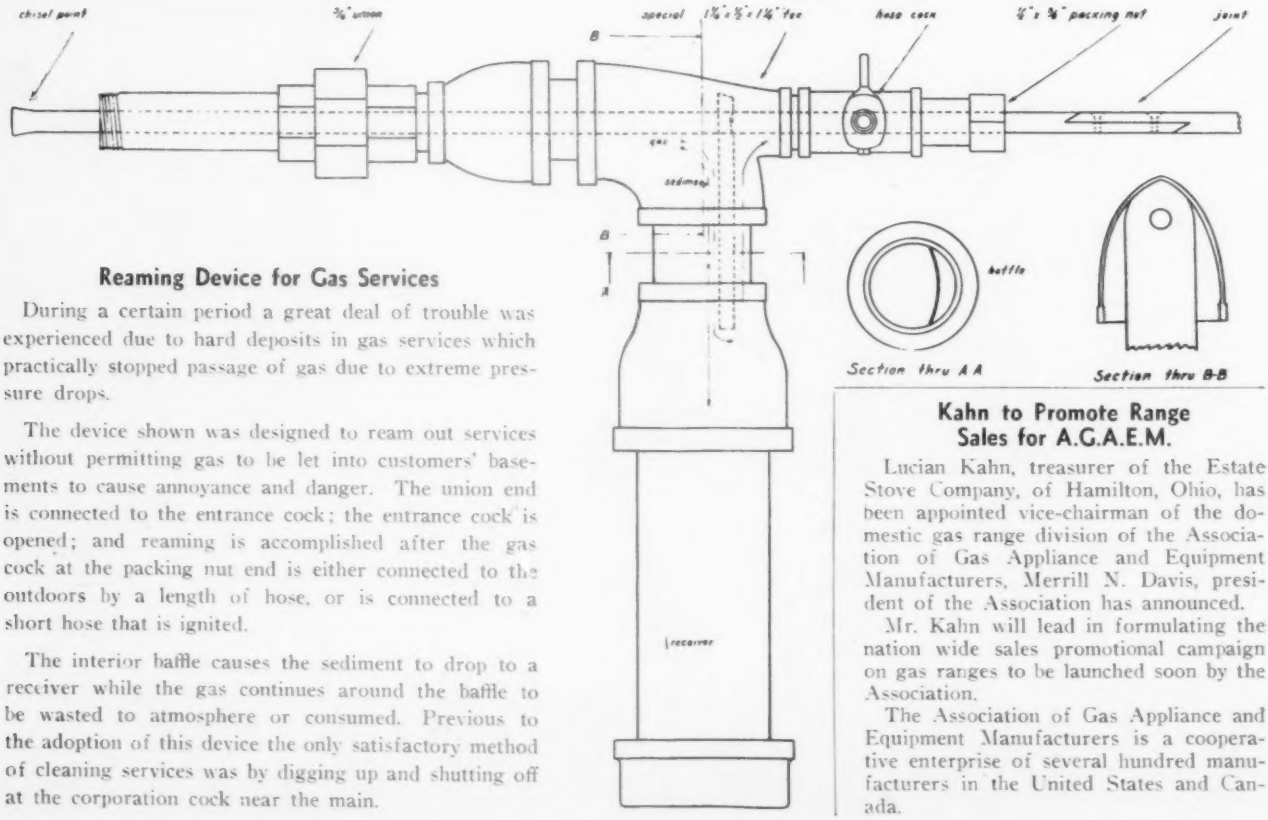
3—The "Sour Puss." The main thing to remember with this type prospect is that her sour attitude and often belligerent reaction to an approach, is usually a defense, because she subconsciously realizes she is easy to sell. First, try to make her friendly. Forget your selling role for the time being. Comments on everything from good neighbors to the Japanese militarists take her off her guard, she cools down and after that, is often the easiest of all prospects to handle.

4—The "Sphinx." Difficult to fathom. The salesman does all the talking, the Sphinx all the listening. Can't tell whether she is impressed or disgusted. This type hears all, sees all. What she lacks in talkativeness, she makes up in mental alertness. Don't run all through the sales talk and then try to sell this prospect. Send up trial balloons occassionally. Try to get her to comment definitely by asking her something point-blank about the merchandise that will demand a reply one way or the other. In some cases, salesmen have found it effective to do something indicating that they consider the sale closed, such as taking out the order book and asking for shipping instructions. This gets a comment, one way or the other, and subsequent remarks, at least disclose the direction in which she is thinking, so that the salesman is better able to gauge his selling appeals from then on. Often this prospect's actions, such as repeated handling or marked attention to a certain product, betray her leanings. If she won't talk, watch her actions.

5—"Calamity Jane." Habitual user of the "I can't afford it," objection, which has become more prevalent in recent months. Calamity Jane will work this excuse to the limit unless the salesman uses the right technique. The first requisite in selling the "I can't afford it" prospect is to get the right mental attitude yourself. The salesman who visions only relief beneficiaries in his territory will usually accept "I can't afford it" as fact, when it is largely fiction. Be skeptical of all "I can't afford it" prospects. Many have the money but are afraid to spend, particularly in off-periods of business. An apologetic tone is effective in disarming Calamity Jane. Well trained salesmen, when they encounter this prospect, come back with, "Of course, since you haven't the money to take advantage of this attractive offer." Usually this prospect interrupts at this point with the assurance that she has the money but does not think it wise to spend at this time. With this confession, the salesman can proceed without worrying longer about, "I can't afford it."

This objection manifests itself in another way. Calamity Jane may buy but wants to buy cheap. This question put bluntly usually squelches this desire. "If you take into consideration all the things you have purchased, which class has given you the most satisfaction, the purchases made at low prices or those made at quality prices?" Every "I can't afford it" prospect will admit that she has received better value from the higher priced quality merchandise. Then the sale is more readily consummated.

Often the strong salesman with a proposition made to order for a prospect, fails to sell and wonders why. He antagonized the fundamental characteristics in the prospect's ego or failed to adjust his sales talk to them. A size 36 suit won't fit a 300-pound man, a square peg won't go in a round hole, a 5-gallon can won't hold 10 gallons of water, neither will the same sales talk fit all types of prospects. Making the sales talk fit the prospect is a requisite of successful salesmanship.



Reaming Device for Gas Services

During a certain period a great deal of trouble was experienced due to hard deposits in gas services which practically stopped passage of gas due to extreme pressure drops.

The device shown was designed to ream out services without permitting gas to be let into customers' basements to cause annoyance and danger. The union end is connected to the entrance cock; the entrance cock is opened; and reaming is accomplished after the gas cock at the packing nut end is either connected to the outdoors by a length of hose, or is connected to a short hose that is ignited.

The interior baffle causes the sediment to drop to a receiver while the gas continues around the baffle to be wasted to atmosphere or consumed. Previous to the adoption of this device the only satisfactory method of cleaning services was by digging up and shutting off at the corporation cock near the main.

Kahn to Promote Range Sales for A.G.A.E.M.

Lucian Kahn, treasurer of the Estate Stove Company, of Hamilton, Ohio, has been appointed vice-chairman of the domestic gas range division of the Association of Gas Appliance and Equipment Manufacturers, Merrill N. Davis, president of the Association has announced.

Mr. Kahn will lead in formulating the nation wide sales promotional campaign on gas ranges to be launched soon by the Association.

The Association of Gas Appliance and Equipment Manufacturers is a cooperative enterprise of several hundred manufacturers in the United States and Canada.

Burner Sales Are Easier

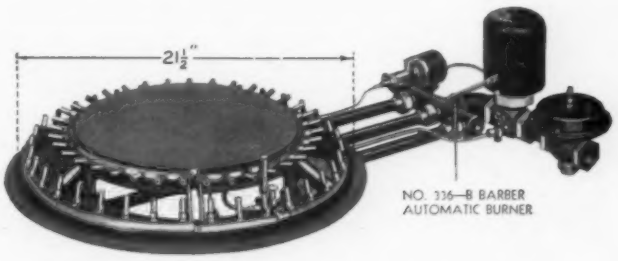
--with BARBER BURNERS!

In selling a gas conversion burner to a customer, you may not get very *technical*. If you do, it's easy to demonstrate BARBER *engineering* superiority, from supply line to thermostat. It's there on the B.T.U.'s and the B.T.P.'s (Better Talking Points).

What the customer usually wants to know, however, is the *performance* record of the burner—and there again BARBER stands alone. For economy and trouble-free service, BARBER's 20-year record is unparalleled. BARBER is the emblem of a responsible manufacturer, with installations running high into the thousands.

Remember *that* when you take on the responsibility of selling *any* conversion burner to the public.

The "B" Model shown comes in 8 sizes for round grates 12″ to 34″ in diameter. There is also a wide range of sizes for oblong grates. Patented BARBER Jets insure complete combustion, with a "scrubbing" flame action on walls of firebox. No fire brick or refractory elements needed. Baltimore Safety Pilot. Listed in A.G.A. Directory of Approved Appliances. Ask for Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators.



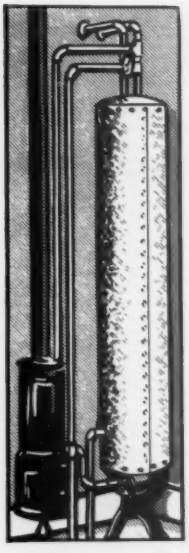
THE BARBER GAS BURNER CO., 3704 Superior Ave., Cleveland, Ohio

Address Michigan Inquiries to **The Barber Gas Burner Co. of Michigan, 4475 Cass Ave., Detroit**

BARBER *Automatic* JET GAS BURNERS

SELL "ON TAP" HOT WATER TO BUILD DOMESTIC LOAD

Convert PART TIME Gas Or Other Fuel Users Into "On Tap" FULL TIME Gas Consumers With Mirro-Shell—A Unique And New Method Of Indirect Heating By Reflection.



Before

MIRRO-SHELL

A single unit for quickly making a tank into a highly efficient, steel jacketed, automatic water heater.

By assembling Mirro-Shell upon new tanks, dependable and fine appearing automatic heaters can be had for an attractive price.

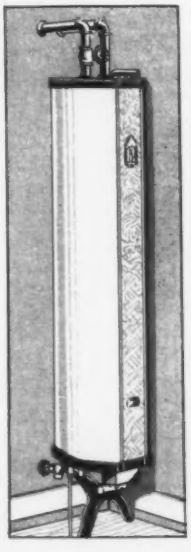
Inputs from 4500 to 10,000 B.T.U. per hour for 30 and 40 gallon tanks.

Many thousands now installed—use it to build your domestic load.

FOR DETAILS WRITE

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN



After

Kitchen Planning Headquarters of Philadelphia Gas Works Co.

By
Beatrice Cole Wagner
Home Service Director,
The Philadelphia Gas Works Company

The pioneering days of kitchen planning service in the gas industry were in 1933 or thereabout. It was at that time The Philadelphia Gas Works Company organized its kitchen planning department as a sub-division of Home Service which plays a part in the sales promotion program. While it operates under the direction of the home service director, it is supervised by a college graduate experienced in architectural drafting and interior decoration. The kitchen planning service is offered free of charge by the company to its customers.

The Architects Building was selected for the Kitchen Planning Headquarters. This location was chosen because we believed that being so situated among various other displays of building material and accessories our service should be most accessible to the builder and architect and equally as conveniently located for the individual gas consumer. Furthermore, this arrangement has lent itself well for cooperation with both our domestic sales division and the wholesale division.

In nearly five years of operation our records each year show a substantial increase in sales results and increased interest among the cooperating manufacturers, as well as among the architects, builders, and other customers.

The Kitchen Planning Headquarters is confined to what appears to be a small cottage, complete in every external detail even to a small rock garden and fountain in front of the house. The entrance to the display is through the front door opening from a low open veranda. The entrance leads into the office which is furnished with easy chairs for the customer and equipped with all the necessary materials such as drawing boards, etc., required for preparing the requested drawings.

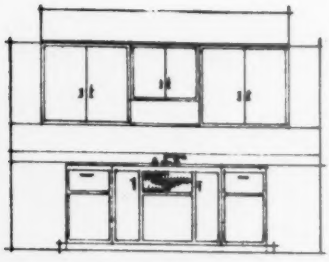
There are five model gas kitchens, each exhibited in a room of the cottage. Each of the five model gas kitchens is completely equipped with everything that belongs in the kitchen. This equipment is supplied by cooperating manufacturers of kitchen

Right—Exterior of Kitchen Planning Headquarters of The Philadelphia Gas Works Co., located in Architects Building.

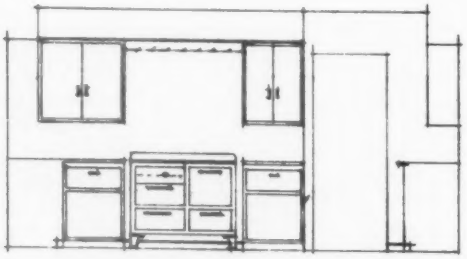
Below—"Suntan" Kitchen, Colors Tan and Red Equipped with St. Charles Steel Cabinets, "Quality" Gas Range and 5 cu. ft. Electrolux Refrigerator.

Below, Right—A corner in the Office and Drafting Room of Kitchen Planning Headquarters, Dorothy C. Lovatt, Consultant is giving advice to customer.

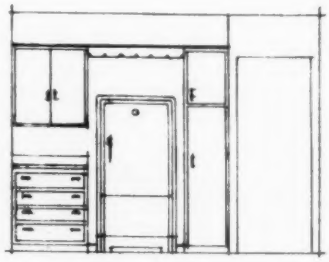
Typical Floor and Elevation Plans as Prepared by Home Service Bureau



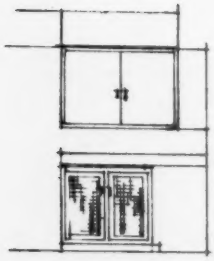
SINK



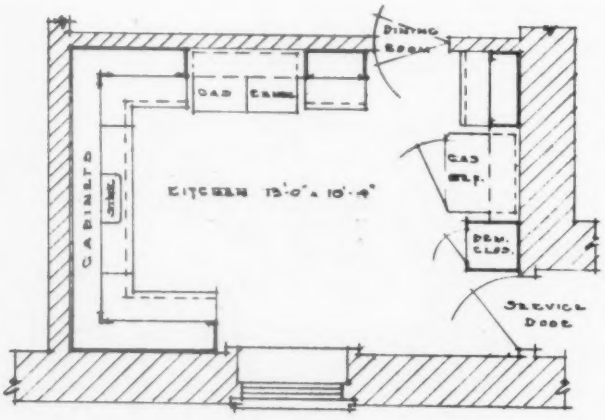
RANGE ELEVATION



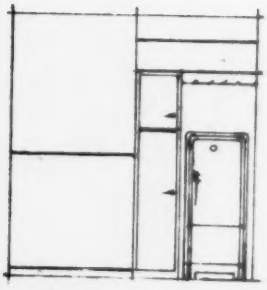
REFRIGERATOR



VEG. BIND



KITCHEN PLAN BY
THE PHILADELPHIA GAS WORKS CO.
KITCHEN PLANNING HEADQUARTERS
17th & SANSOM STS. PHILA.
D.C.L. ORIGINAL SCALE ¼" = 1' 0"



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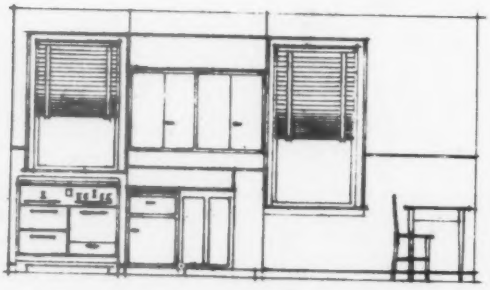
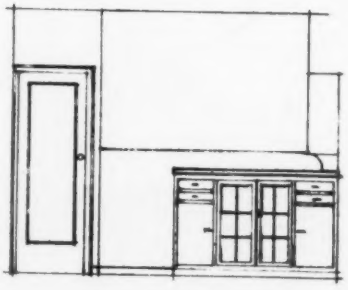
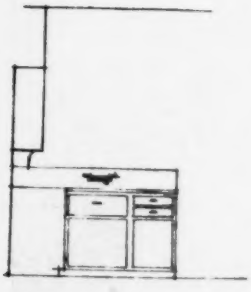


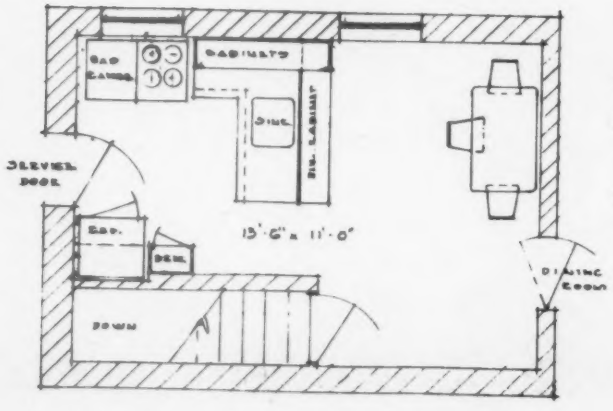
RANGE ELEVATION



DIVIDER CABINETS



SINK



KITCHEN PLAN BY
THE PHILADELPHIA GAS WORKS CO.
KITCHEN PLANNING HEADQUARTERS
17th & SANSOM STS. PHILA.
D. C. L. ORIGINAL Scale ¼" = 1' 0"

cabinets, sinks, wall coverings, floor coverings, lighting fixtures, ventilating fans and accessories. The gas ranges and gas refrigerators are placed there by the gas company. Each kitchen is completely different from the others in every respect, not only in shape and arrangement, but in size and price. Some are suitable for large houses and small houses while others are typical for apartment use. In each kitchen there are typed lists explaining the materials and equipment, giving the manufacturer's name and address of distribution. Literature and booklets pertaining to the various pieces of equipment and material are also conveniently placed at disposal for the customer. With this arrangement, together with information given the customer by the kitchen planning consultant, the customer can make her or his own choice and form an unbiased opinion since no direct selling is done in the Headquarters.

As the plan of procedure in developing and completing a kitchen plan is quite a lengthy one to discuss at this time, may I just say that every manufacturer has his share of leads without preference given to any one. The cooperation between the manufacturer and the kitchen planning consultant is very satisfactory so that our system operates smoothly. In most cases the consultant contacts the customer in the office and if necessary proceeds to her home before preparing the drawing. And when the installation takes place she follows up the installation along with the cabinet representative.

During the past two years two new model gas kitchens have been built by manufacturers and placed so as to adjoin our cottage in order that these kitchens may be supervised by our kitchen planning consultant. I mention this as it is one indication of the enthusiasm of cooperating manufacturers.

Our most recent plan being developed is a special service to the builders. While this service has not been formally presented to them at this time it is our earnest hope that it can be launched in the near future. It will, providing conditions develop as we anticipate.

Briefly, this is our plan. For some time we have felt the need of being more helpful to the builder in guiding him with the planning of the kitchen so that he can produce a real woman's kitchen that will give her efficiency in her work and beauty and design that will stimulate her and make her kitchen a place in which she will like to spend her time. Also we will suggest basement arrangements especially for the entertainment room, keeping in mind the happiness of every member of the family.

In order to efficiently meet this problem we viewed a hundred or more new houses being built in the city. We noted the size of the kitchens and basements and general layout, etc. Then we classified these houses as to price, that is—low price, medium low, medium high, and high price.

Now several designs are being made to suit the typical type kitchens that are being built here in Philadelphia in keeping with the various price ranges. These plans are drawn to one-fourth inch scale and will be reproduced as blueprints for the builders' use free of charge. Furthermore we plan to enlarge them about four times their original size so that the builder can consult them more easily. All these kitchen designs are to be known as "Step Saving Kitchens" and will bear this inscription and seal of identification, so that the builder wishing to display them in his house when open for inspection can do so.

There are many more details regarding the service that might be interesting to enlarge upon but space does not permit at this time. But in closing I would like to say it is difficult to place a value upon kitchen planning results. That is, the results during the pioneering days. But I am of the firm belief that kitchen planning is here to stay and that it will remain upon its own merits.

Stars of the Screen Cavort in this All-Gas Kitchen

The recent release of "Merrily We Live," a Hal Roach-M.G.M. comedy affords gas companies an unusual opportunity to tie in their local newspaper advertising with the appearance of the film.

Such stars as Constance Bennett, Brian Ahearne, Billie Burke, Alan Mowbray, Patsy Kelly, Ann Dvorak, Tom Brown and Bonita Granville are in the cast.

A bulletin of American Gas Association gives a complete plan for tie-in activities as this film moves along from town to town.

Over twenty minutes of action takes place in the ultra modern kitchen here shown which is equipped with three gas ranges and three Electrolux gas refrigerators.

Gas Company floor displays, show cards, theatre lobby displays, newspaper mats and tie-in activities with dealers are included in the general plan which is fully described in the A.G.A. bulletin. Early and complete arrangements in advance of the local appearance of the film are necessary for unified action.

Quo Vadis
or
Where Are We Going

By
Carl B. Wyckoff
Public Service Company of Colorado

WHERE we are going is a highly involved question today. Most of us are at a loss to even know where we are *at*, to use the vernacular of the street. About all we know, is where we have been.

The last few years have been pleasant ones, as we have seen business improve year after year from a stage of stagnation to the highly satisfactory year of 1937. We can take considerable personal credit for our achievements, but let's not kid ourselves too much. We were on an incoming tide and capitalized on general conditions to the extent of our individual ability.

The incoming of the new year, however, is very comparable with the morning after the night before, except that we cannot relieve the situation by a shot in the arm, or any of the similar expediencies. Our sales curves are taking a perpendicular drop regardless of our efforts, and if we of the gas new business departments are going to survive, we will battle an outgoing tide and our ingenuities are surely to be taxed.

Those in whose hands rest the responsibilities are facing a position which requires the soundest of consideration, for anything is apt to happen. The Public Utility business is not popular in some very powerful circles and it finds itself in the same position as the chip that is trying to control the wave. We are vulnerable from all angles and can hope for no outside relief.

Financing is passe, so there will be a serious curtailment of expenditures for extensions, thus preventing the opening of any virgin territories. Buyers have hibernated. Those of the installment class are well committed, while those who have money are afraid to let loose of it. This is not encouraging when combined with the tightening of credits and shortening of terms. Past experience has demonstrated the lack of wisdom in curtailing expenses through too drastic a reduction of personnel. It is quite possible to retrench to some extent thusly, but the man who is most successful year in and year out will realize that he must maintain a safe, sound, well-trained organization at all times, and his resourcefulness in this emergency may prove his true worth as an executive.

There seems to be a number of outstanding points to consider. First of all will be to forget gross sales from that point of view. It is a grand and glorious feeling to be able to report large volumes of sales, but what "getteth a man" to make big sales and no profits. "Building the load" is insufficient during these strenuous days when the very existence of the department is virtually at stake. We are born new, theoretically, each day and certainly cannot coast along very far on what we did last year when the department is in the red and ready cash so elusive. As mentioned previously in these columns, it is quite possible that part of the solution lies to a great extent in our policies, and that far more may be accomplished possibly with a lead pencil than by throwing up our hands and depleting our good well-trained sales organization.

Gross merchandise sales is a poor goal in the main at the present time and must be secondary to gross merchandise profit, not to the extent of "let the buyer beware," as our competitors will take care of that part, but on the basis of a sound mark-up and the scrutinizing of each individual sale to see that it carries its proportional share of selling margin. In this, do not overlook any intangible items, for it is easy to let an accumulated 10% slip by unnoticed until the verdict is read at the close of the month.

Regardless of how severe a repression, slump in the buyers' market, or whatever you wish to call it, there will always be some sales made. When business is good we are not prone to take gross profit too seriously for the volume of business as a whole will take care of sales made on thin margins, but when gross sales shrink to a dangerous level, it behooves us to look each horse in the mouth before the contract is closed. It may take more time or an extra call, but one should have in mind figuratively that if he cannot sell $2,000.00 on a 10% net basis it may be good salesmanship to try to make 20% on the $1,000.00 which he may be able to sell. This is an exaggeration, of course, but at the same time it is a good star to which one can well hitch his wagon.

Here is where the new business manager can use his lead pencil advantageously. A compensation set-up based primarily on gross merchandise profit will certainly do more than anything else to stimulate co-operation on the part of the sales representatives, for naturally it means dollars in or out of his pocket. This basis, combined with a proper salary or guarantee, together with reasonable bonuses for load building results, is all that can be done along this line.

Price cutting is suicidal. In fact the reverse is more likely in order for the reasons previously enumerated. The latter action, if feasible, can be done conscientiously for we are not dealing with the necessities of life.

Quite possibly closer supervision will assist to some extent. Pulling door bells with unsuccessful battles at the screen door, do not help to build up one's morale, but as sales cannot be made without contacts, it naturally follows that the more calls the more sales. We cannot expect a full eight hours work in the territory in this line of work as we would with the mechanic, but the average man who cannot put in considerable more time during these times of stress than he has in the past few good years, is certainly the exception.

Gas Tips

Abandoning the conventional steam kettles, Gray & Company, Portland, Oregon, have adopted gas hot plates in a successful effort to further improve an already high standard of glaced and other processed fruits. One order for gas hot plates has been followed by another as the easily controlled gas burners have established their superiority for several of the processes in this plant.

A higher quality salted nut product is being produced with a deep fat fryer heated with gas immersion (gas heated tubes right in the kettle). The General Grocery Company (wholesale), Portland, Oregon, has just installed a heavy duty nut cooker of this type with a thermostatic temperature control. The gas immersion type of heating together with the temperature control is said to preserve the oil longer and in better condition and produces a better product of greater uniformity. These installations were made with the cooperation of the Portland Gas & Coke Co., Portland Oregon.

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AMERICAN GAS JOURNAL
53 Park Place New York

Blaw-Knox Opens All-Steel Gas Heated Home

With the opening for public inspection of the first Blaw-Knox all-steel experimental home at 114 Pennsylvania Avenue, Clairton, Pa., details of materials and construction were made public.

While officials stated that design was aimed toward the development of a low-cost home, this was not done at the expense of good materials, good workmanship, or the neglect of proper insulation, comfort and appearance, essential for a present-day dwelling.

The 5-room house, which is of colonial design with a gabled roof, is 44 feet 2 inches wide by 24 feet 2 inches deep, containing approximately 900 square feet exclusive of porches. It is pointed out that the house is only one of a large number of possible designs, since the use of standard steel panels permits a wide range of planning for four, five, or six room homes.

The unit now open to the public has a living room 17 feet 9 inches by 13 feet 1 inch, a kitchen 14 feet 5 inches by 10 feet, a utility room 8 feet by 10 feet, a master bedroom 11 feet 1 inch by 13 feet 1 inch, a guest bedroom 10 feet 6 inches by 10 feet, a bath 8 feet by 6 feet, and a side porch 10 feet by 7 feet, with a covered front entrance.

An outstanding feature of the Blaw-Knox home is in the exterior walls which are constructed of standard size insulated panels of wall height. These are made in prefabricated units either 40 inches or 20 inches wide, so that complete flexibility of design within the limits of the employment of these units is possible.

The panels consist of a steel frame of rust-resisting copper-bearing steel channels welded together. The interior and exterior surfaces of the panels are then covered with metal clad, one inch water-proof rigid insulation, thus forming an enclosed three inch air space. The panel is then completed with copper-bearing formed steel sheets laminated to the insulation with a rust-inhibitive asphalt emulsion cement.

The fabricated panels are delivered ready for erection, with a shop coat of metal priming paint, and provide a smooth finish for both interior and exterior walls without the use of exposed bolts, welding, or screws.

No cutting is required to form windows or doorways, as all panels are fabricated to the exact size required and can be quickly erected with special connectors furnished.

The roof framing consists of double steel channels welded together. The truss members are bolted together, cross braced, and bolted to the heavy gauge top plates of the side walls. They are designed to carry maximum loads on clear spans of 24 feet.

Standard steel ventilated type casement sash with wood trim is used for all windows. Interior and exterior doors are of wood with wood frames and trim. Front and side porch materials are of steel with ornamental welded steel columns. Base interior ceiling cornice molds are of wood.

Heat is provided by a gas fired heater and winter air-conditioner, giving a completely automatic warm air circulating system that heats, filters, humidifies, and purifies the air.

The design of wall and roof construction has been conducted to give a maximum of insulation to provide homes warm and easy to heat in winter and cool and comfortable in the summer.

The heat loss of ordinary construction is about 2½ times as much as in a Blaw-Knox home of steel construction.

Servel District Managers Meet

Thirty regional and district sales managers of Servel, Inc., representing the New England states, all of New York state, Pennsylvania, and Delaware, submitted optimistic reports regarding the sales potentialities of gas-operated refrigerators during the Spring and Summer refrigeration selling campaigns at a meeting held March 26 at the offices of Servel, Inc., 51 East 42nd Street, New York.

The meeting was addressed by George S. Jones, Jr., vice-president and general sales manager of Servel, Inc., who stressed the importance of the continuance of intensive selling during the next few months.

"Reports from the field during the past two weeks show that there has been a decided 'pick-up' in the demand for our Company's products," Mr. Jones stated.

"Consequently, we have every confidence in making big strides during the forthcoming Spring and Summer refrigeration campaigns."

It was announced at the meeting that read magazines, and on the radio, with newspaper advertising as a leading medium, will play an important part in stimulating interest in the company's product, during the Spring and Summer selling season.

(Continued from page 34)

With the continuous treatment since followed, observations have been made, not sufficiently conclusive at this writing, to be included herein, but which definitely indicate an improvement in distribution conditions, that would economically justify the permanent adoption of the process.

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LYLE C. HARVEY

Harvey New President of Bryant Heater

As a result of a six-month survey of the gas heating industry The Bryant Heater Company, Cleveland, O., announces two important personnel moves and accelerated merchandising plans for the future.

Effective March 22nd, Lyle C. Harvey, former Vice President, became President and General Manager. Gordon Rieley, previously Sales Manager, is now Vice President in Charge of Sales.

According to the Bryant announcement, these promotions are part of a new program for increased activity resulting from a recent independent and far-reaching survey both of the gas heating industry and of the most effective ways to increase business with and for the gas utility companies. The study under way for some months was also for the purpose of determining if tentative Bryant plans for future aggressive activities met present conditions and the requirements of the gas industry.

Because of the unusual possibilities in gas heating, the program calls for an immediate increase of Bryant merchandising activities to stimulate consumer acceptance of "Automatic Heating with Gas."

The S. R. Dresser Manufacturing Company of Bradford, Pennsylvania, manufacturers of pipe couplings and other pipe line equipment, and parent company of Bryant, will continue to supervise Bryant affairs through Fred A. Miller, Chairman of both the Dresser and Bryant Boards, and H. N. Mallon, Dresser President, now Chairman of the Executive Committee of the Bryant Heater Company.

"Using CHACE Thermostatic BIMETAL in our FRASER FURNACES"

FRASER FURNACE CO., INC.
STOCKTON, CALIF.

Fraser Floor Furnaces are compact, gas burning, heating units. Occupy very limited space and produce heat at low cost. Chace Bimetal is the active element used in the safety pilot, which automatically shuts off the gas supply in event pilot is extinguished.

For dependable automatic movement in your product investigate the possibilities of Chace Precision Thermostatic Bimetals. Sold in sheets, in strips and in finished form ready for assembling in your product.

W. M. CHACE CO.
1610 Beard Avenue - - - Detroit Mich.

Underground
PIPE AND CONDUIT LINES
as by Magic!

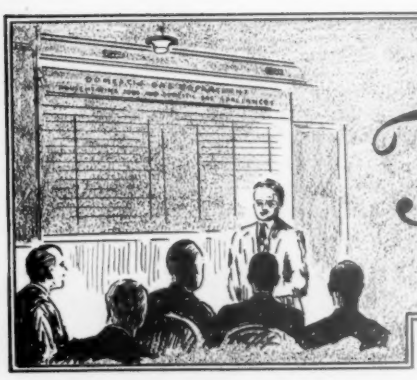
So quickly and so efficiently does the Hydrauger install Underground Piping that it seems like Magic! No ditching, no pavement cutting, no backfills, no after-settling; that's Hydrauger's way of saving 90% on every underground pipe installation. It bores a clean open-hole horizontally under pavements, traffic, gardens, railroads, embankments—right through sand, clay, conglomerate, rock, shale or any underground formation. Pipe slips through this hole readily and without damage to its protective wrapping or coating. Hydrauger operates economically and does not hazard vehicular traffic in any way.

New HIGH POWERED MODEL 2A-2X (Patented)

HYDRAUGER CORP., Ltd.
116 New Montgomery Street
SAN FRANCISCO
Send for Bulletin No. 5

Operated by a powerful air-motor. Can bore 4½" hole at a foot per minute! Target "sighting" controls boring accuracy.

HYDRAUGER
"The Mechanical Gopher"



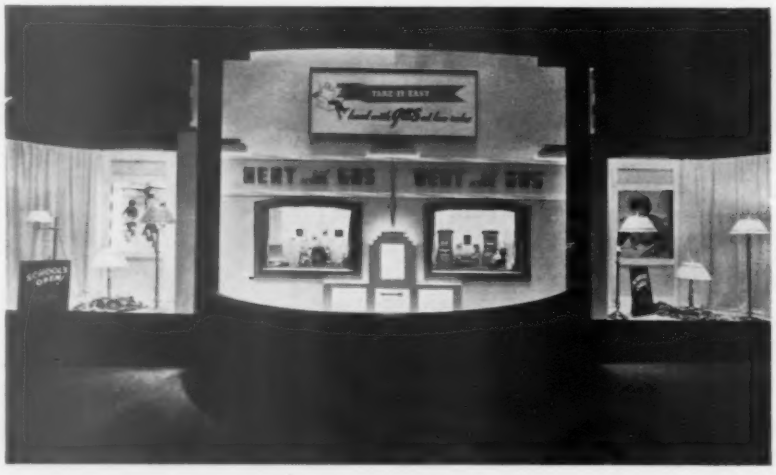
Timely Sales Chats

By William H. Matlack

*Among us all we have merchandisers here and there that in spite of what may be said about prices being too low and too high that there is a substantial increase on the part of the average housewife to purchase the higher priced gas ranges. Not long ago we were told by a gas man that a popular priced range that he gave a big play in his advertising brought people in but that the sales of the number were very, very unsatisfactory. As we view it, this is the trend of the times and rightly so—it is utterly foolish to try to meet the new competition for the customer's range dollar by offering outmoded ranges. It seems it is a mistake to even give the old models the amount of advertising space some folks do. It is our opinion that the major amount of our range promotion should be given to the very latest and best designed and constructed range it is possible to purchase. Play up new heats from top burners, new broilers, new low temperature oven cookery, table tops, conveniences, new methods of venting, insulation and the flush to the wall models. Now that we have these innovations in GAS ranges give them the works as far as exploitation is concerned. Tell women how beautiful they are, talk of lines, baking and cooking qualities, coolness, one piece sanitary tops which are easy to keep clean —tell them—feature for feature and ask them to buy * * * Sell gas cookery—sell gas hot water service and you'll go places * * **

Recently we intimated that we would next talk about merchandise quotas and how to set them up to attain a desired increase in cubic feet or therm (why don't we get together on the standard to use) desired, but as we talk to gas men and hear what they are saying we are of the opinion that possibly it would be better to talk first of what might be undertaken before quotas are set. From figures that we get from McCall's, Arthur Hirtse's "Research Rakings" we learn that during the first eight months of 1937 the gas industry gained 252,000 new customers, on this basis. Not considering what the "Recession" may have done to us we should have a gain of around 300,000 customers for the year 1937. With these new customers as well as our old ones we should plan to get a build up that will sell them new uses and keep them sold. We should solidify the work the association and the manufacturers are doing through

It's Always Summer-Time
In Your Kitchen
Preserve Foods
SAFELY
with GAS Refrigeration
A comfortably warm kitchen is far too warm for food preservation. Putting food outdoors causes breakdown of food cells by freezing and thawing. Gas refrigeration solves this problem. It operates silently, freezing without moving parts on high grade gas for less than 2 cents a day. See the beautiful 1938 Servel Electrolux models. Easy payments if desired.
The Gas Company
GAS DOESN'T COST—IT PAYS



*national advertising by planning to use localized advertising that would tie up the interest that this promotion is bound to arouse. Our advertising and promotion must be more intelligently planned and produced, it must be scheduled to give us larger local coverage, to tie in one local media with another. It is not enough to depend upon newspaper advertising alone to produce the results we must have to stay in the procession, sell our merchandise and increase the use of our service. We must consider in our plans for promotion not only newspaper and direct mail advertising, but we must plan to make our window display advertising and our store displays an integral part of it. ** Advertise on poster boards, the radio, through cooking schools and demonstrations. It is not enough to say to prospective purchasers; "Here's a Modern Gas Range or Water Heater or Refrigerator that you can buy for so many dollars and pay for it so much per week," or it is not enough to say to him "this is the last thing in a cool, clean cooking appliance," in a newspaper advertisement, a folder or booklet sent to his home, or a radio spot. Gentlemen, you have to do this job completely in every detail. You have to keep everlastingly selling the customer from the time you secure his interest until you actually get his name on the dotted line. You may interest him with your printed pieces, your newspaper advertisement, and he may intend to buy, or your salesman may interest him to the extent that he will promise to call, but you cannot let him ride at that. You have to have your windows dolled up to say "Here's that range YOU'RE interested in. This is the place to buy it," and further you have to follow through in your store, have a range hooked ready to go—and then if your sales girl or man can't get the order, brother, you will do well to see what's what and how much he or she knows about the job of selling. At this juncture you might check up to see how much training he or she was given before becoming a 'salesperson."*

IF YOUR WATER TANK IS FAILING AND NO LONGER KEEPS WATER HOT, NOW IS THE TIME TO CHANGE IT TO THE BEST THAT CAN BE BOUGHT.
AN AUTOMATIC GAS HEATER IS NOTED FOR ITS SPEED, PROVIDING PLENTY OF HOT WATER TO SUPPLY YOUR EVERY NEED.
THERE NOW ARE SPECIAL PRICES—TAKE ADVANTAGE WHILE THEY LAST, THEN YOU TOO WILL SMILE WITH PLEASURE TO FIND HOT WATER TROUBLES PAST.
Full 24 Gal. Capacity
Is the hot water service in your home all that it should be? Why not end, once and for all, the inconveniences of an inadequate hot water supply by installing an automatic storage gas water heater? For a limited time you can save $14.00 on the 24-gallon average family size. Liberal terms if desired.
The Gas Company
GAS DOESN'T COST—IT PAYS

In this 7½", 2 column newspaper copy prepared and distributed by The Ohio Fuel Gas Company, Old Doctor Therm, the Tank Specialist, feels the pulse and takes the temperature of the sad-eyed, run down old fashioned water heater. His apprehension is evident. Note by comparison the genial smile pervading the phiz of the owner of a new insulated automatic storage gas water heater. Illustrations and text have strong purchase appeal.

*Remember you can't expect an unsung Patterson for twelve bucks a week * * * But my, oh! my, if we don't turn off this chatter the editor will—so cheerio until next month.*

LOOK AT THE BURNER
...on a modern gas range
See how each burner lets all sizes of cooking utensils. This is important because wasted heat makes kitchens hot and fuel bills high.
Nearly all ranges have insulated ovens today, but only modern gas ranges have controlled-heat burners. A tiny "simmer" to a great rush of heat in a fraction of a second . . and with hundreds of degrees of heat in between . . that means faster cooking, better cooking, cooler cooking at lower cost . . and a cleaner kitchen.
Modern gas burners fit any size pot or pan . . no need to buy special sizes and shapes to get the greatest kitchen efficiency you ever saw. See the new gas ranges at our showroom or at your plumber-dealer's . . see for yourself the miracle of modern gas . . and remember, there are no expensive connections for you to make.
The modern gas range illustrated above is just one of the many 1937 models now on display which can be purchased for as little as $2 down and with three years to pay.
There's nothing like GAS for COOKING
Quicker cooking, better cooking, because you can control the right amount of heat needed to bring out the finest flavor in food.
REFRIGERATION
Gas refrigeration is silent—no moving parts to wear out—low operating costs.
WATER HEATING
Hot water when you want it—day or night—lower cost, dependable service.
HOUSE HEATING
Heat your house automatically with Gas. Nothing to bother with, no fuel to order, no dirt, no muss.
SIGNATURE
Or Your Plumber-Dealer

Here's the "ACID TEST"
of HEAT WHERE YOU WANT IT
THE TEST EXPLAINED
No wasted heat means no waste of money. But more . . it means faster cooking. A cleaner kitchen. And you don't have to buy special cooking utensils to enjoy this modern advantage.
Practical engineers have made important changes in gas ranges. Years of testing and experimenting have made good gas ranges better.
And the result is a marvel of kitchen efficiency. New gas ranges save money, save time, cook better, cook quicker . . in fact, almost cook a meal without your help. The simmer burner directs heat just where you want it, without waste. Cook with a 1/4-inch stewpot, or melt butter in a 2-inch measuring cup . . the flame will be just right. See the new gas ranges today . . see for yourself the miracles of modern gas . . and remember, there are no expensive connections for you to make.
The modern gas range illustrated above is just one of the many 1937 models now on display which can be purchased for as little as $2 down and with three years to pay.
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HOUSE HEATING
Heat your house automatically with Gas. Nothing to bother with, no fuel to order, no dirt, no muss.
SIGNATURE
Or Your Plumber-Dealer

News of the Industry

Industrial Men in Gas Fuel Program

The A.G.A. Conference on Industrial Gas Sales was held in Pittsburgh, Pa., March 7 and 8 with an attendance of more than 150 natural and manufactured gas men from all over the country. Among the highlights of the conference was the prolonged discussion prompted by a paper entitled "Penetrating the Industrial Air Conditioning Market" by F. M. Johnson, Kathabar Div., Surface Combustion Corp., Toledo, Ohio. Practically all of the papers were illustrated with slides.

The conference opened Monday morning with Mr. Clark presiding and the keynote address was made by Charles E. Bennett, President, The Manufacturers Light & Heat Co., Pittsburgh, Pa. His subject was "The Desirability and Value of Industrial Gas Business" and he especially stressed the fact that the most important job today was sales, and that a logical and economic development and the retention of industrial gas markets is absolutely necessary in the gas business.

Illustrating how the industrial load filled the valleys of the load curve he gave for his company delivery figures on the coldest day in almost 30 years, Jan. 27, 1936, for different classes of business. Summing this up he said "our industrial customers on the peak day required only 19.8% of our production and transportation capacity, yet they purchased 42.3% of our total output during the year. All other classes of customers (chiefly domestic) required 80.2% of our capacity on the peak day and used only 52.7% of our year's output.". He then went on, in a most interesting manner, to develop the subject of an economic balance between domestic and industrial gas sales.

Alexander Forward, Managing Director, American Gas Assn., paid tribute to the industrial gas men in a brief address and voiced his appreciation of the work they were doing.

The development of an improved type of crucible gas furnace for melting brass was described in a joint paper "Improvements in Crucible Melting With Gas" by Ralph D. Hawkins, The Bridgeport Gas Light Co., Chairman, Non-Ferrous Metals Committee and Oliver D. Pritchard, The Brooklyn Union Gas Co., Brooklyn, N. Y. It was shown how by changing the design of the old melting furnaces and utilizing high temperature insulating refractories a reduction in fuel consumption of up to 40% is effected.

"Immersion Heating Capitalizes the Advantages of Gas For Soft Metal Melting" was the title of a paper by Elmer B. Dunkak, The C. M. Kemp Mfg. Co., Baltimore.

A most informative case history was presented in "A Discussion of Up-to-Date Gas Forging Practice" by M. W. Martin, Public Service Co. of Indiana, Indianapolis. Details of a series of tests on oil-fired forging furnaces resulting in the adoption of a combination gas-oil burner utilizing 80% gas were given.

Harvey C. Weller, Surface Combustion Corp. whose subject was "A Discussion of Gas in the Glass Industry," told of how forced convection heating, which has been so successful in modern industrial furnace applications in other fields within the temperature ranges of 600 to 1200 deg. F., has been applied to gas lehrs with very happy results. Most important result was the elimination of the muffle. Mr. Weller then discussed the direct firing of ceramic colors on glass. "An oxidizing atmosphere is necessary and when manufactured gas with considerable sulphur is used, gas radiant tubes are employed," he stated.

The relative merits of "Long and Short Gas Flames in Industrial Heating" were

Left: Charles E. Bennett, Pres., The Manufacturers Light & Heat Co., Pittsburgh
Right: Hale A. Clark, Detroit City Gas Co., Chairman, Industrial Gas Section and Frank H. Trembly, Jr., Vice-Chairman.

Left to Right: Alexander Forward, Managing Director, American Gas Association; J. P. Leinroth, Public Service Electric & Gas Co., Newark, Chairman, Advertising Committee; Quartet from New England:—L. B. Crossman, Boston Consolidated Gas Co., Lawrence E. Wagner, Providence Gas Co., Ralph D. Hawkins, The Bridgeport Gas Light Co., Chairman Non-Ferrous Metals Committee, and J. William Harrison, Hartford Gas Co. On the right, H. A. Sutton, Public Service Electric & Gas Co., Newark, Chairman Publicity Committee, confers with Chairman of Advisory and Nominations Committees, Ralph L. Manier, Central New York Power Corporation of Syracuse.

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ADJUSTABLE BELL JOINT LEAK CLAMPS
Pittsburgh Equitable Meter Co. 274

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TITAN WATER HEATER CONTROLS

AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

Pressure relief is obtained through a spring-loaded valve which opens when the pressure reaches a predetermined point. Should the water become overheated to 200° F, a fusible disc melts and lets the water escape thereby preventing a further increase in temperature.

The Titan Relief Valve serves as a coupling connected in the line thereby eliminating the necessity and expense of a tee fitting. To replace fusible disc, it is not necessary to disassemble valves or piping in any way.

Designed for application to storage or range boilers. Prevents corrosion, scalding and explosion.

Catalog and full information upon request.

The Titan Valve & Manufacturing Company

Thermostats • Safety Pilots • Relief Valves • Safetystats
9913 Elk Avenue Cleveland, Ohio

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

ANDALE COMPANY
1600 ARCH STREET
PHILADELPHIA

then related in a paper so entitled by A. M. Capper, Continental Roll & Steel Foundry Co. Another definition is "luminous flame" and "clear flame" and Mr. Capper, in describing the luminous flame, stated that generally "for a given flame of gas through the same burner, this luminosity is increased with an increased length." Points in favor of the long luminous flame were: An increased rate of transfer; more uniform temperature; less maintenance of refractories and less oxidation or scaling. In favor of the short flame were better control of furnace atmospheres; less combustion volume required; lower initial cost and elimination of smoke. Valuable information on all these points was given leading to the conclusion that the long flame was the best for many applications. During the following discussion Karl Emmerling, The East Ohio Gas Co., declared that the luminous flame has proved invaluable in continuous heating furnaces in steel plants when the flow of gases was counter to the flow of work. He cited 20 or 30 gas furnaces of that type in his territory, all but three fired with gas luminous flames. In answer to questions Mr. Capper thought 1200 deg. F. the lowest practical temperature at which luminous flames should be used.

Paul J. Ziegelbaur, Detroit City Gas Co. spoke briefly on "A Study of Propane and Butane as Industrial Fuel," saying that he had sent out a questionnaire on this subject and that the replies were so conflicting in ideas as to render the effort almost worthless.

"New Developments in Applying Gas to Decorating Kilns" by Philip Dressler, Swindell-Dressler Corp., Pittsburgh, described the interesting gas decorating kiln recently installed at the Lenox potteries at Trenton, N. J. This is heated with gas radiant tubes. Mr. Dressler thought that the gas radiant tube method of heating would eventually become standard for porcelain enamel furnaces.

T. W. Halloran, New York Power & Light Corp., Chairman, Food Industries Committee, then delivered a valuable paper "A Discussion of Gas in Food Manufacturing Industries." Figures were cited to show the enormous size of the food production industry and classifications were given to indicate where gas might be sold to advantage. Special processes such as coffee and peanut roasting, candy making, banana ripening, etc., were then discussed and approved equipment described.

How a big industrial gas load was built during the depression was told by T. E. Butler, The Peoples Natural Gas Co., Pittsburgh, in a paper "Selling Natural Gas During a Recession." Mr. Butler stated the depression made the building of the load possible because prior to that the mills and factories were too busy to take time to convert furnaces and fuel costs were a secondary consideration.

One method of selling cited by W. N. Blinks, General Gas Light Co., Kalamazoo, Mich. in his paper "Proven Methods For Selling Gas Unit Heaters to Factories," is to introduce the idea at the time the plans for a new building are being drawn. Savings due to basement elimination, first cost of equipment, less fuel used, and lower operating expenses usually sell not only space heating but process heating as well. Plants with wornout heating systems, buildings previously unheated or with inadequate heating equipment, factories with some departments shut down during slack periods or small industries occupying portions of large vacant plants—all offer excellent opportunities to sell gas unit heaters.

The Kathabar or lithium chloride system of air conditioning with gas was described in a paper entitled "Penetration of the Industrial Air Conditioning Field" by F. M. Johnson, Surface Combustion Corp., Toledo, O. He also told how the same equipment that was used for dehumidification in summer could be used for humidifying and heating in the winter. He cited installations in a drafting room, a cellophane printing plant, a match drying tunnel, a room for treating photographic paper, etc.

E. P. Kramer, Chairman, Gas Engine Power Committee, in discussing the subject from the gas engine viewpoint stated that one had but to "realize that the compression end of the air conditioning business is very little different from the compression end of the ice business," to glimpse the possibilities here. He added that the margin of profit in cold storage and ice plants was often so small that the question of the prime mover to use becomes a very important consideration.

Outstanding among the awe-inspiring spectacles that will draw visitors to the Fair, will be the majestic "Court of Flame", the focal point and main entrance to the gas industry's exhibit.

New York World's Fair Preview

Prominent figures in business and industry will serve under the leadership of Walter S. Gifford, President of the American Telephone and Telegraph Co., on a committee in charge of the Preview of The World of Tomorrow to be presented by the New York World's Fair 1939 on April 30, 1938.

The Preview will signalize the rapid progress of the Fair's construction a year ahead; and emphasize the value of the Fair to America.

A brilliant Motorcade will proceed through the streets of Manhattan to the Fair site in Queens and a huge parade will originate in Queens and move to the Fair site where the marchers will review the Motorcade. An impressive ceremony will be held at the Fair site where leaders of business, industry and government will broadcast a World's Fair invitation to the distant points of the globe. On the site, after the ceremonies, a program of popular entertainment will be presented to the Preview visitors.

The Motorcade, entirely mechanized, with approximately 300 floats and 300 other vehicles, will be seen by more than 1,000,000 persons as it passes along the streets of Manhattan and proceeds to the World's Fair site. It will take two hours to pass a given point proceeding at the rate of ten miles an hour.

Designers are now working upon hundreds of floats to be shown in the most colorful procession ever presented in New York, and dozens more will be ready for the Motorcade before April 30th.

Consolidated Edison Co. at New York World's Fair

The foundation of the exhibit building Consolidated Edison, Inc., is to erect at the New York World's Fair 1939, is already under way. Floyd L. Carlisle, Chairman of the Board of Consolidated Edison and also member of the Fair's Executive and Finance Committees and Board of Governors, officiated at the initial ceremony on March 10th. In the audience were Grover A. Whalen, President of the Fair Corporation; George McAneny, Chairman of the Fair's Board of Directors; Consolidated Edison officials and Trustees of Edison Electric Institute.

"Consolidated Edison is very glad indeed to participate in the New York Fair," Mr. Carlisle said, "as its significance is not only municipal and national but world-wide in its importance to mankind.

"The purpose of the exhibit we will make in our building is to identify the services of Consolidated Edison with the life of the people of this great city. Our services in the supply of electricity, gas and steam enter into every phase of that life. We intend to make a dramatic representation of the integral part in the industrial and social life of New York played by Consolidated Edison."

The central portion of the structure, directly back of the centre of the glass-enclosed fountain, will be known as "Panorama Hall." It is to be a semicircular chamber 125 feet wide, with a 50-foot ceiling, capable of accommodating 800 visitors. In it will be displayed a great two-dimensional model of New York from Yonkers to Coney Island, designed to tell the whole story of Consolidated Edison service in electricity, gas and steam. The power stations of the organization, its gas containers and steam plants are to be shown.

ENCLOSED CASE GAS ENGINES
The Cooper-Bessemer Corp. 302

FIELD REGULATOR — SPRING TYPE AND WEIGHT TYPE
Pittsburgh Equitable Meter Co. 276

FLANGED DIAPHRAGM REGULATORS
Connelly Iron Sponge & Governor Co. 225

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Size	Min. Power	Max. Power
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19"	20.8	185.4
16"	15.0	166.5

Type LC Regulator can be readily set to meet any requirement within limits of the design. Write for Bulletin No. 200-B-1.

CONNELLY

IRON SPONGE AND GOVERNOR CO.

Chicago, Ill. Elizabeth, N. J.

R. S. Agee Appointed Promotional Sales Manager of A.G.A.E.M.

R. S. Agee, of Washington, D. C., has been appointed by the Association of Gas Appliance and Equipment Manufacturers to the position of promotional sales manager.

R. S. Agee

His immediate attention will be given to planning the program for the coming nation-wide promotion of the modern gas range through a co-ordinated drive by manufacturers, utility companies and dealers.

Mr. Agee comes to the Association from the Washington Gas Light Company, where for the past three years he has served that utility as their sales promotion manager, in charge of both utility and dealer sales training and promotion, during which period he made many unique contributions in utility and dealer sales plans. He has won nation-wide recognition through his addresses before national and sectional utility conferences and the magazine articles he has written along the lines of his utility sales promotion work.

Previously, Mr. Agee had gained considerable success in selling major gas appliances in the field from door to door. In the brief space of six years, he has made remarkable strides in covering the sales end of the business—all the way from utility to allied dealer merchandising.

Mr. Agee's earliest merchandising experience was obtained as a salesman of gas ranges and space heaters in Oklahoma. He assumes his new duties about April first.

Booklet on Stainless Steel

"Should Husbands Keep House?" is the title of an attractively illustrated 32-page booklet just issued by The American Rolling Mill Company, Middletown, Ohio.

The first part describes the sorry predicament of "men without women" when they try to do the housework, take care of the children, and manage in a bewildered, haphazard fashion the other activities of the domicile during the absence of the "Missus."

Another part of the booklet explains how research in the manufacture of specialty and steel sheets has helped to make possible so much attractive, labor-saving home equipment.

There is also a section devoted to the proper care of porcelain enamel and stainless steel in household equipment and appliances: the kitchen range, refrigerator, washing machine, laundry and bathroom equipment, cooking ware, tableware, and other products.

A copy of the booklet may be obtained by writing to Armco. Pictures show the newest designs in metal equipment, including stainless steel for the dining room table.

Combination Folder-Booklet for Tie-in Advertising

The A. G. A. Committee to Conduct National Advertising has distributed samples of a colorful folder-booklet combination for local advertising and merchandising activities. The outer folder bears the theme, "Tune-Up for Spring," and is backed up with color reproduction of advertisement inserted in nine of the popular magazines during the spring months, having a total circulation of nearly 14,000,000 copies.

An eight page booklet featuring color reproductions of model kitchens accompanies the folder.

This excellent cooperative material may be used as a mailing piece (requiring no envelope), for counter or sales floor use, for cooking demonstrations, model homes, etc., for salesmen, and for home service representatives' use. The combination piece sells for 3½ cents a copy and is available through DeVinne-Brown Corporation, 52 Duane St., New York.

Safety Gas Main Stopper Company

Announcement is made by Francis Greer Goodman and Elizabeth A. Goodman that they will continue business under the above title as successor to the corporation of the same name which they have voluntarily dissolved. The offices of this well known manufacturer of Gas Main Stoppers, Distribution Equipment and Pipe Line Supplies has been located for many years at 523 Atlantic Ave., Brooklyn, New York, and their products have international distribution.

INDUSTRIAL GAS BOILERS

Tubular or Flueless

¾ to 45 H.P.

P. M. LATTNER MFG. COMPANY

CEDAR RAPIDS, IOWA

Magic Chef Sales Campaign

American Stove Company recently released a spectacular Sales Promotion Plan, featuring their Magic Chef Gas Ranges, unlike anything in the company's history.

The Plan is complete in all details. It is based on an exceptional stove value known as the 3100 Series Magic Chef. Special promotional pieces consist of attractive newspaper ads, colorful streamers, Display Cards, Combination Window and Floor Display, Diecut Star Stickers, Mailing Pieces, Envelope Stuffers, Trailer Films and Radio.

The New Magic Chef Sales Promotion Plan

The Plan was created in such a fashion that it can be used as a complete "5-Star" Program, or any portion can be used. The number of helps the dealer uses classifies his promotion program. Any combination of two items carries the "2-Star" rating. Any combination of three or four items carries the "3-Star" or "4-Star" rating and so on to the highest rating of "5-Star."

The Magic Chef Special Sale campaign is unique in that it is an unusually complete program requiring no planning or worries on the dealer's part, and best of all, little expenditure of money.

Any interested utility or dealer can obtain a copy of this plan simply by writing American Stove Company, Advertising Department, 1825 East 40th Street, Cleveland, Ohio.

Gas Water Heater Sales Progress

"From coast to coast, gas company registrations in the Prize Parade, the sales promotional campaign on automatic gas water heaters, have shown a marked increase, and the enthusiasm in this project apparently indicates an impatient desire to go ahead full steam," C. W. Berghorn, managing director of the Association of Gas Appliance and Equipment Manufacturers, reports. Mr. Berghorn says there appears to be a greater interest on the part of dealers and salesmen this year in the Association's promotional activities.

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LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

American Stove Co. Announces Resignations and New Officials

Mr. George F. Fiske, Treasurer, and Mr. Thomas Rath, Vice President in charge of advertising, have resigned from the American Stove Co., Cleveland, Ohio.

Mr. Fiske's first introduction to the gas stove business was with George M. Clark Co., Chicago, Ill., where he started in November 1885. In 1902 the American Stove Co. was formed and Mr. Fiske became its first Treasurer, which position he held up to the time of his recent resignation.

GEORGE F. FISKE THOMAS RATH GEORGE E. BAKER CHARLES F. FARNHAM

Mr. Thomas Rath's first introduction to the stove business was April 1st, 1881, with the Hull Vapor Stove Co. Incidently his salary at the start was $2.50 per week.

In 1893 the company moved to Lorain, O. In 1902 it was taken over by the American Stove Co. and Mr. Rath became Manager of the Vapor Stove Co. Division.

It was under Mr. Rath's direction that experiments were carried on with the Lorain Oven Heat Regulator. In 1919 national advertising started on the regulator and the first advertisement appeared in the May, 1919, issue of Good Housekeeping. Since then Mr. Rath has had entire charge of all publicity campaigns of American Stove Co.

The new treasurer is Mr. George E. Baker, who has been auditor since 1930. He went to work for the company in 1911.

Mr. Charles F. Farnham who has been with the company since 1907, and Mr. Rath's assistant since 1919, will succeed Mr. Rath as Advertising Manager.

Jerome H. Nymberg Branch Manager Gar Wood

Frank H. Dewey, general manager of the air conditioning division of Gar Wood Industries, Inc., has announced the appointment of Jerome H. Nymberg as manager of the Detroit air conditioning branch to succeed Norman Saylor. Mr. Nymberg has been associated with the Gar Wood organization for the past fifteen years. Prior to his promotion to the branch managership, he was manager of installation and service for the Detroit air conditioning branch. Henry W. Jackson has been named to fill the position of installation and service manager vacated by Mr. Nymberg.

Extension Instruction in Hydraulics is Offered in Revised Wisconsin Course

The Extension Division of the University of Wisconsin, at Madison, announces that its elementary course in hydraulics—the basis of designs for the distribution of water, collection of sewage, and transportation of oils—was fully revised in January and now includes the latest applications of researches which make the computations fit the actual movement of fluids more accurately. The subject is taught by the department of civil and structural engineering by the correspondence-study method.

This course teaches the fundamental theory of hydraulics, including the flow of fluids in pipes and open channels, the various devices used to measure flowing fluids, and the pressure of fluids in submerged surfaces. Included in it is a practical application of the viscosity of fluids and of the ratios used to make the formulas applicable to different conditions and fluids.

Courses like this, in the technical field, are offered by the University of Wisconsin as a convenient and practical means of working for professional fitness, without interruption of employment.

Northern Indiana Public Service

All officers of the Northern Indiana Public Service Company were re-elected March 17 at a meeting of the board of directors in Hammond. The directors also declared a full quarterly dividend on the preferred stock of the company.

The meeting followed the annual stockholders' meeting, at which the directors were re-elected unanimously.

The officers elected are John N. Shannahan, president; Dean H. Mitchell, vice-president and general manager; Walter A. McDonough, secretary; F. E. Thacker, treasurer, and B. R. Nightingale, assistant secretary.

The directors chosen at the stockholders' meeting were Mr. Shannahan, Indianapolis; Joseph M. Farrell, Goshen; Edwin A. Walcher, Averill C. Colby and Mr. Mitchell, all of Hammond, and Laurence K. Callahan and Stuart J. Barrett, both of Chicago.

Consolidated Edison Appointments

The following organization changes were recently announced by W. Cullen Morris, vice-president in charge of System gas engineering operations, Consolidated Edison Company of New York, Inc.: A. E. Turner, superintendent, was made manager of the Customer Service Department; C. E. Muehlberg, assistant general superintendent, succeeds Mr. Turner as general supreintendent. W. C. Oeckler, assistant general superintendent, continues in that position. Alfred W. Fuller, former assistant superintendent, was made superintendent of the gas Meter Repair Bureau. His assistant superintendents are Frank J. Kelly and David R. Jones.

Recipe Book Popular

Distribution of the Mystery Chef's recipe book, "Be an Artist at the Gas Range" has passed the 2,000,000 mark. Total number of copies printed and now on the presses is 2,200,000. The program featuring the Chef has been on the air less than two and one half years.

In December 1937 the Chef announced the preparation of a pamphlet containing twenty-seven new recipes. To date 425,000 copies of this pamphlet have been printed, with the prospect that 500,000 copies will be in circulation before June 1. During the last two months there has been a notable increase in demand for both the recipe book and the pamphlet. In addition, the seventy-eight companies participating in the program have distributed to customers thousands of copies of the Chef's "$4.00 a Week Menus."

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EDITOR, AMERICAN GAS JOURNAL, 53 PARK PLACE, NEW YORK

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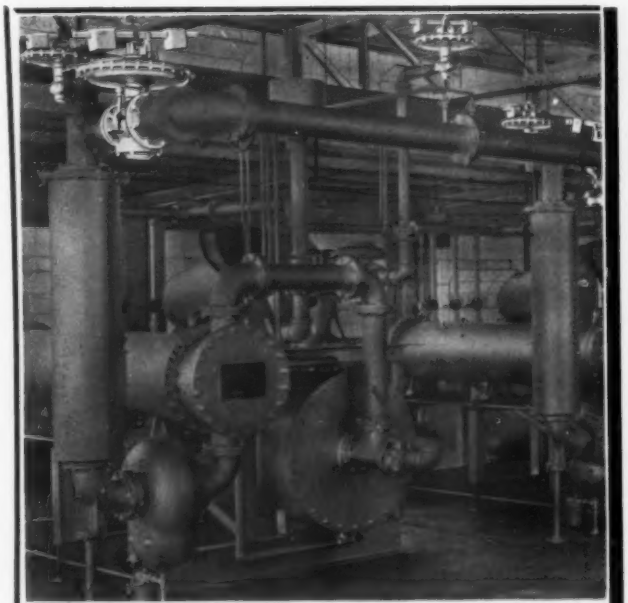

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28-40 Penn Ave. Pittsburgh, Pa.

Catalogs

Pumping Engines. Bulletin 3400 of Fairbanks Morse & Co. describes vertical, two cycle oil field, pumping engines operated by gas or oil. Capacities and details of construction are given.

Steam Jet Ejectors. Ingersoll-Rand Company of Philipsburg, N. J. in a well illustrated 28-page bulletin explains the application and characteristics of ejectors and illustrates the operation and arrangement of all types of ejectors with either surface or barometric precoolers, inter and aftercondensers.

No-Thread Fittings. These are described in much detail in a 16 page bulletin just issued by S. R. Dresser Mfg. Company, Bradford, Pa. The fittings are unique types of self-contained pipe joints that connect pipe without threading. All you need to make a pipe joint is one of these fittings, plain-end pipe, and a wrench. The resulting connection is not only easy to install, but makes a permanently tight, flexible joint, suitable for oil, gas, water, air, and many other services.

Safety Devices. Willson Products, Inc., of Reading, Pa., has just issued a new catalog of industrial safety devices. The catalog, which is well illustrated, covers the complete Willson line of eye, nose, throat and lung protectors. Included are more than fifty types of goggles for every conceivable purpose, a dozen welding handshields and helmets, seven United States Bureau of Mines approved types of dust respirators, air line respirators, abrasive helmets, etc.

Refractories. Quigley Co. Inc., 56 W. 45th St., New York, has just issued an 8-page bulletin No. 328 describing the advantages obtained by use of "Insulbrix" in many installations. These are light weight fire brick, which combine the advantages of a high refractory and an efficient insulator of low heat storage capacity.

They are used for direct exposure to flame and gases, in boiler furnaces, ovens, kilns and other high temperature equipment. Superseding use of thick walls of heavy refractories which are sluggish to heat, slow to respond to load variations.

Another bulletin No. 322B describes "Q-Chrome," a neutral chrome base refractory cement, used for laying fire brick, chrome, magnesite, and other refractory brick and tile, in metallurgical and boiler furnaces where extreme temperatures and destructive slagging, chemical and abrasive actions are encountered.

It is widely used in the steel and nonferrous metallurgical industries because of its neutral refractory characteristics, and resistance to high temperatures, slagging and abrasive conditions, and in boiler furnaces burning hog fuel, bagasse, high sulphur coal or oil, refinery acid sludge, low grade asphaltic oils, etc.

Blowers. Roots-Connersville Blower Co. has recently issued Bulletin 21-B-19 which discusses the characteristic positive movement of air by the "Victor-Acme" Rotary Positive Blowers. Covering normal capacities ranging up to 500 CFM at pressures up to 7 or 8 lbs., or equivalent vacuums, these blowers are used in a variety of processes and applied to many special machines, where the handling of definite volumes of clean dry air is necessary.

The many standard sizes listed in this bulletin permit the economical selection of one that will meet the specified requirements of the different services, some of which are illustrated, while others are listed.

Humidity. Hygrometer catalog No. 6502, issued by The Brown Instrument Co. covers the complete line of Brown Recording and Controlling Hair Hygrometers. Both Electrically Operated and Air-Operated Humidity Controllers (Psychrometer Type) are described. For copy of this catalog address: The Brown Instrument Company, Wayne & Roberts Avenues, Philadelphia, Pa.

Crawler Hoist. The Harnischfeger Corporation of Milwaukee announces Bulletin X-39 entitled "P&H Multi-Service Crawler Hoist," which describes in detail the many features combined in this new general utility high-speed machine.

With interesting job photos and line drawings, the many uses of their Multi-Service Crawler Hoist are explained to bring home the many new advantages of this machine.

The Natural Gas Convention

At the annual convention of the Natural Gas Department of the American Gas Association, May 9-12, in New Orleans, four interest-packed days await delegates and visitors from the entire continent.

Interesting general sessions, with nationally prominent speakers, will be presided over by Robert W. Hendee, Chairman of the Natural Gas Department, and by Thomas R. Weymouth, New York City, Vice Chairman of the Department.

The Program Committee headed by H. E. Meade, of New Orleans, has prepared one of the most constructive and all-inclusive programs in the history of the natural gas industry. The bringing up-to-date on every phase of the business of those interested in natural gas is the goal and duty of the Association. This is possible through cooperative effort of the various committees culminating in these conventions and committee meetings. The New Orleans program is replete in forward looking papers and addresses.

On the General Sessions program, in addition to an address by Mr. Hendee, General Manager, Colorado Interstate Gas Co., Colorado Springs, Colorado, on "The Future of Natural Gas," will be addresses by N. C. McGowen of Shreveport, Louisiana, President of the American Gas Association; Merrill N. Davis of Bradford, Pennsylvania, President of the Association of Gas Appliance and Equipment Manufacturers and J. D. Creveling, of New York, who will speak on "Natural Gas At The New York World's Fair."

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A strong program, well balanced and of exceptional interest to every industrial and commercial gas man, both manufactured and natural, has been arranged for the A.G.A. Hotel, Restaurant and Commercial Sales Conference to be held in the Belmont Plaza Hotel, New York City, Monday and Tuesday, May 23-24, 1938. This conference will be sponsored jointly by the Industrial Gas Section of the American Gas Association and the Metropolitan Industrial Gas Sales Council. Hale A. Clark, Detroit City Gas Co., is Chairman of the Industrial Gas Section and Alva L. Palmer, The Brooklyn Union Gas Co., is Chairman of the Metropolitan Industrial Gas Sales Council.

The keynote of the conference will be sales and sales promotion and this will be brought out by the opening address of a prominent utility executive whose company has made an outstanding sales record in recent years. Men well known both to the gas industry and in the hotel and restaurant field have prepared papers on these subjects on which information is most eagerly sought. These men have been carefully selected by the Sub-Committee on Program of which Joseph F. Quinn, The Brooklyn Union Gas Co., is Chairman. A list of these papers and authors will be released shortly.

Obituary

HERBERT W. ALRICH

Herbert W. Alrich, engineer, inventory and regulatory matters for Consolidated Edison Company of New York, and a recognized authority on gas holders, died suddenly March 25 on a New York Central train just entering Syracuse, New York. Mr. Alrich was returning from a vacation on the Pacific Coast and was accompanied by his wife and son. Two weeks ago he suffered a heart attack in San Francisco.

Mr. Alrich was sixty-six years old. He was born in Wilmington, Delaware, and started work at eleven years of age folding newspapers for the *Morning News* there at $1.00 a week. His first connection with the gas industry came in 1901 when he helped in the enlargement of the Ravenswood gas plant in Long Island City. He then worked for other companies in the Consolidated Edison group and in 1913 he became assistant engineer of construction for the company.

During his connection with Consolidated Edison he was actively associated with the construction, extension and maintenance of every gas plant and gas holder of the company and its affiliated companies. Much of his work was concerned with the design and construction of large gas holders and their foundations. He contributed many technical papers to various societies and institutes on the subject of gas holders, and in 1910 he received the Beal Medal of the American Gas Institute, the highest annual technical award of the gas industry.

JOHN S. UNGER

John S. Unger, well-known Chicago gas engineer and ammonia specialist, passed away very suddenly on February 25th, 1938, while sitting at his desk in his office. He was in his eightieth year, but his interest, activity and enthusiasm were unabated, and in recent months he had been spending considerable time in designing apparatus for producing gasoline as a by-product in the manufacture of oil gas.

Mr. Unger graduated from the Politechnician College of Troudheim, Norway, in 1878, as a mechanical and chemical engineer. He came to the United States the next year and decided to make his home here permanently. His first work here was in Pennsylvania, and later, in 1894, he accepted a position with the Western Gas Construction Company at Fort Wayne, Indiana. From there he went to the Solvay Process Company at Syracuse, N. Y., and was sent abroad by them to study coke-oven construction. Later he was with the Milwaukee Gas Light Company, and in 1905 he became City Engineer of Manitowoc, Wisconsin.

He established himself as a consulting engineer in Chicago in 1907, specializing in gas works construction, especially in the building of ammonia recovery apparatus. In this connection he had several valuable patents and his processes were well-known throughout the coal gas industry.

CONVENTION CALENDAR

April

11-13 *Mid-West Gas Association,* St. Paul, Minn.
18-21 *American Chemical Society* —Division of Gas & Fuel Chemistry, Dallas, Texas.
20-22 *Missouri Association of Public Utilities,* St. Louis, Mo., Jefferson Hotel.

May

3-5 *Pennsylvania Gas Association,* Annual Convention, Sky Top, Pa.
9-12 *A.G.A. Natural Gas Department,* Roosevelt Hotel, New Orleans, La.
14-21 *International Petroleum Exposition,* Tulsa, Okla.
16-17 *Indiana Gas Association,* Annual Convention, Hotel Gary, Gary, Ind.
23-24 *A.G.A. Commercial and Hotel & Restaurant Sales Conference,* New York, N. Y.
24-26 *A.G.A. Production & Chemical Conference,* Hotel Pennsylvania, New York.
25-28 *A.G.A.E.M.* Annual Convention, White Sulphur Springs, W. Virginia.

June

9-10 *Canadian Gas Association,* Annual Convention, Royal York Hotel, Toronto. (No exhibits.) G. W. Allen, Secretary - Treasurer, Astley Avenue, Toronto, 5.
16-17 *Pacific Coast Gas Association.* Northwest Conference, Portland, Oregon.
23-24 *New England Gas Association,* Sales Conference, Viking Hotel, Newport, R. I.

September

14-16 *Pacific Coast Gas Association,* Annual Convention, Santa Barbara, Calif.

October

10-14 *American Gas Association,* Annual Convention, Atlantic City. (No exhibits.)

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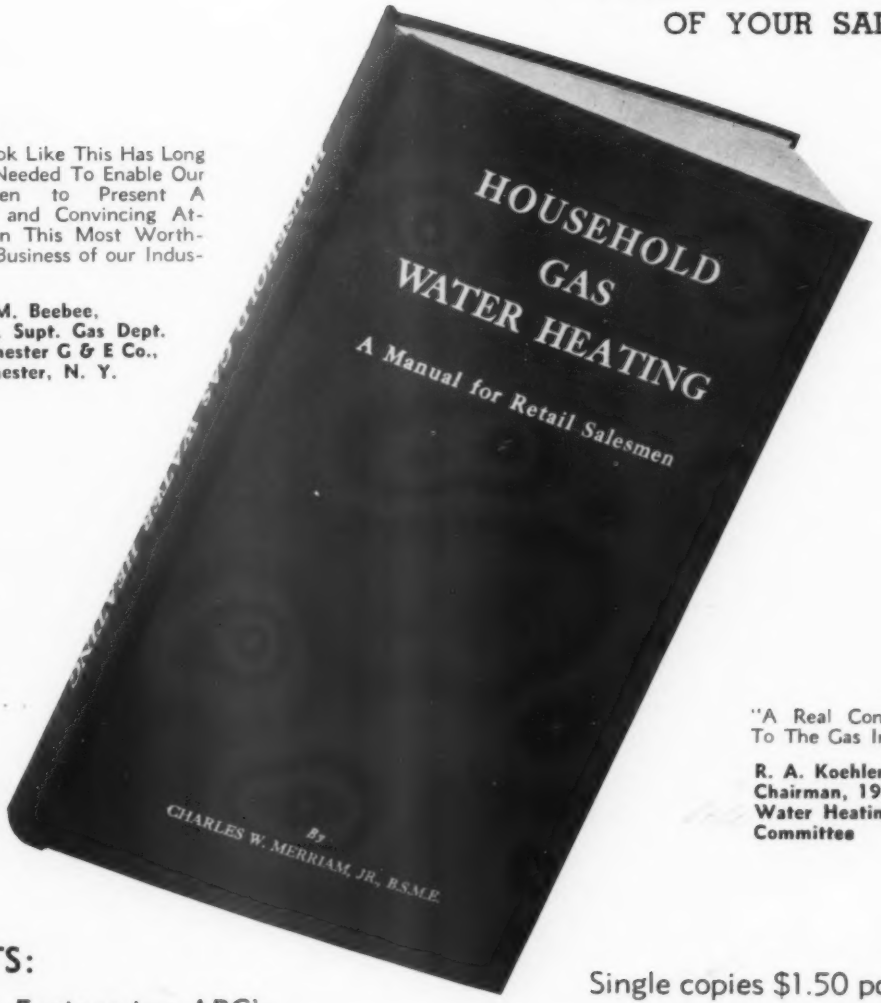

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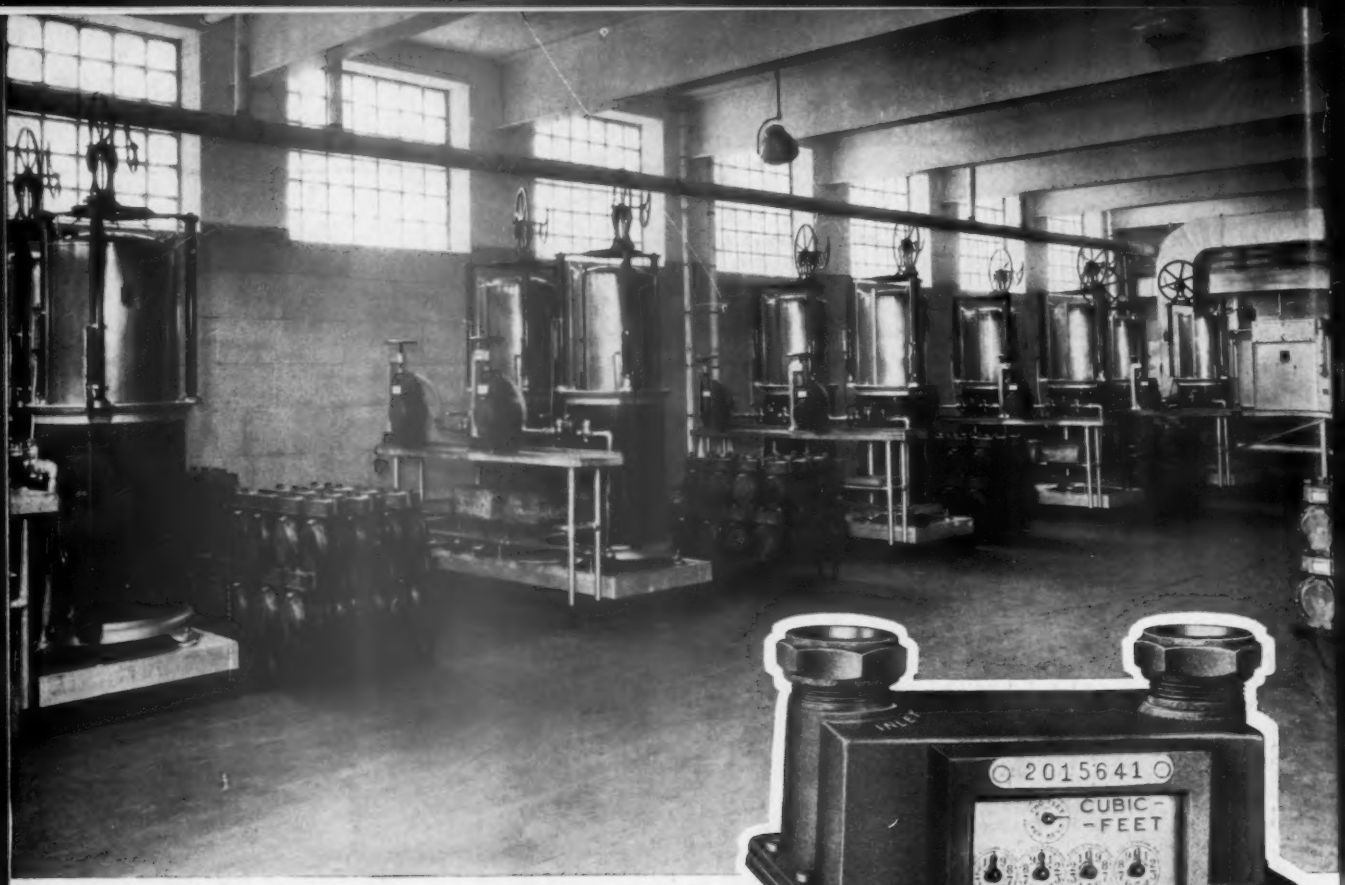

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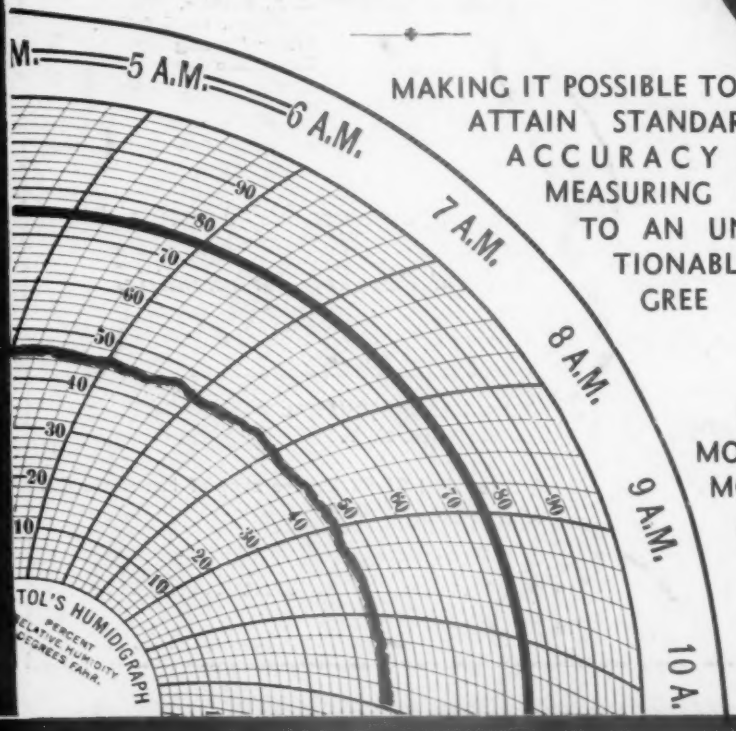

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